RAILROAD GAZETTE

FRIDAY, NOV. 7.

CONTENTS.

Contributions.

Why Accidents Happen.

CORVALLIS, Ore., Oct. 27, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Did it ever occur to you, when looking over the standard code and the probable discipline of certain employés for a cause—the real cause—of collisions and murders on American railroads, to inquire what salary the negligent telegraph operator was receiving; whether he was old enough to overcome the inclination of every growing animal to sleep at night? Again, how many hours of rest and labor had been the share of the forgetful engineer, the busy conductor, or the "slow" flagman?

I have in a humble way been near to a great many railroad accidents, and they are always traceable to the causes suggested, with the exception of cases like "Chatsworth Horror," which was caused directly and indirectly by a Wall Street speculator. As a part of the Wabash System, the T., P. & W. road was robbed, worn out, and neglected; when its earning capacity was gone it was discarded; and with reorganization, while trying to recover itself, to earn sufficient to make the roadway safe, came the "Chatsworth *incident*," as a Wall Street railroad man would term it.

Standard codes will no more prevent accidents than presidents' agreements will prevent rate cutting. Do you think for a moment that the "most reckless agent" cuts the rate in any manner without implied authority? It may be in this way—"you must secure the traffic, but must not cut the rates." This is understood to mean you must be sharp enough to escape detection or give way to some one who will risk it. Many of our roads have the rule you speak of—"dispatchers must not trust an operator to hold a superior train;" also that "if they do, there must be two telegraph offices between the trains at the time it is done." Such rules are issued by the management, disregarded daily, and known to be by chiefs, superintendents and managers. The dispatcher does it because he "must get trains over the road;" take risks, or give way to some one who will. Wrecks result, the management rest on their published rules, and the dispatcher takes the blame.

Good salaries, good men (not boys), short hours and fair rules, which the workmen are allowed to enforce—these are the remedies in either case, and must come from the financial department. Is it not so?

NELSE MANSEN.

To Prevent Butting Collisions.

The Yale & Towne Manufacturing Co.,
STAMFORD, Conn., Oct. 31, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am in receipt of the inclosed letter from my friend, Mr. E. A. Cowper, C. E., of London, whose name has for more than 25 years been prominent among the leaders of enginering in Great Britain, and especially in matters connected with railroad practice.

The letter describes briefly a method devised by him for preventing butting collisions. He evidently desires to give publicity to his plan, in order that American railroad managers may have the benefit of it, and I know of no better way of accomplishing this than through your columns. I trust, therefore, that you will see fit to place the matter before your readers. It will be seen that the plan in question is especially adapted to a line having signal stations, with electric communication and frequent signal posts. HENRY R. TOWNE.

6 GREAT GEORGE STREET,
Westminster, S. W., Oct. 16, 1890.

Henry R. Towne, Esq., etc., etc., etc.:

I wish to put before you a very simple idea for preventing collisions, when two trains have been started in opposite directions on to the same track and it has been discovered before the collision has actually occurred. There have been so many such cases, and one notable one in this country, that some little expense would be worth going to, if only to save money, to say nothing of human life.

Let there be two signal posts a mile apart in the middle of the length between the stations, and with telegraph wires to them from each station capable of letting go a trigger and letting the arms go to danger. More than two posts would be better still, so as to make sure, if possible, of catching the trains apart, before they met. It has generally happened that the mistake has been found out at one or both stations a minute or two after it has been made, so that there would be almost to a certainty time to prevent the smash.

Mr. I. A. Timmis, of 2 Great George street, Westminster, has a good arrangement of magnets for giving action at a distance, and he would let off one to run at a long distance.

If you have no objections, I should feel greatly obliged if you will make this idea known to some of your leading railroad engineers, as it might save human life largely on some occasion, though not to the same extent as my "fog signals" have for many years.

E. A. COWPER.

P. S.—Of course, there should be provision on the posts to enable the guards to attach an instrument and learn which train was to back.

Iron Tender Frame—Brooks Locomotive Works.

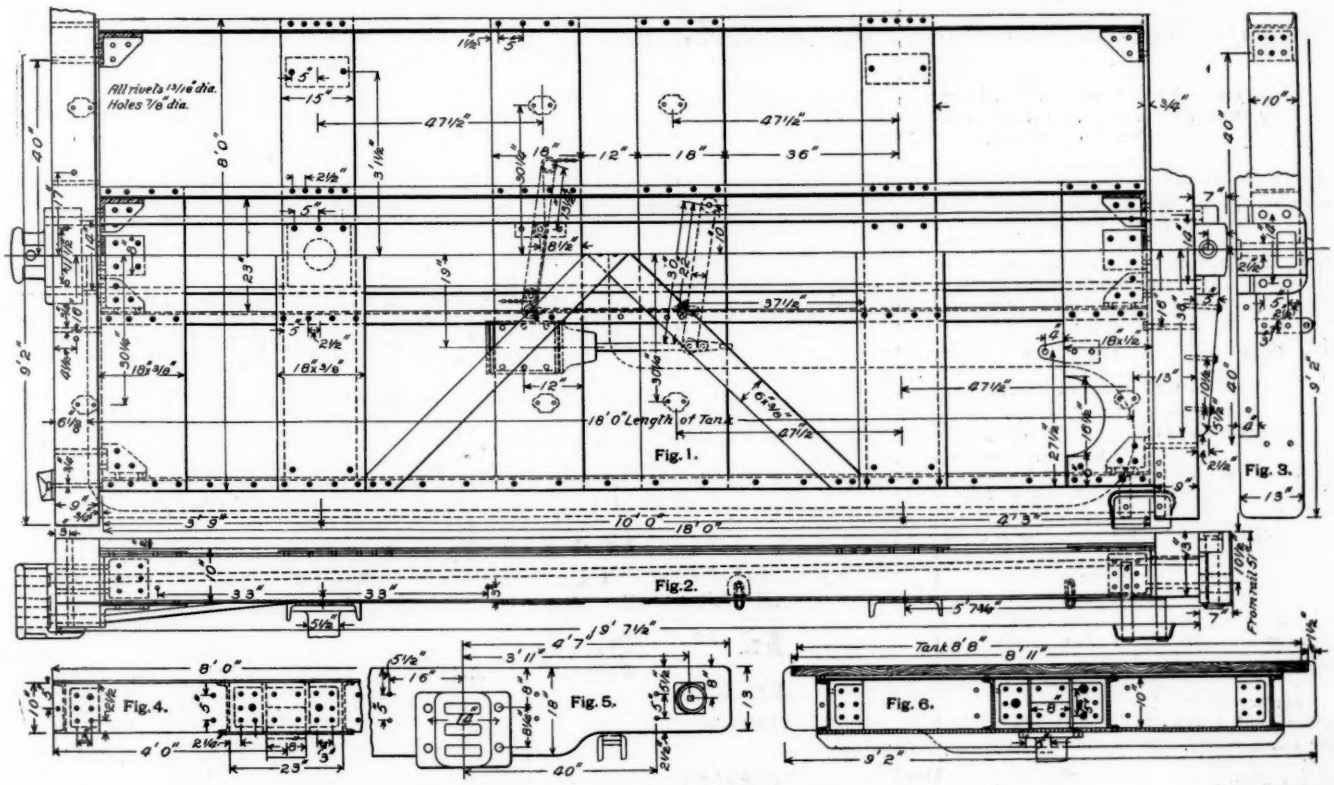
The standard iron tender frame of the Brooks Locomotive Works is shown in the accompanying engraving. Fig. 1 is a plan and half section showing the arrangement of the sills and the attachment of the braces. Fig. 2 is a side elevation, which illustrates the method of attaching bumpers, drawheads and longitudinal draft rods, also the channel iron body bolster which carries the centre pin. In figs. 3, 4, 5 and 6 the design of the corner brackets, location of the rivets and tie rods, and also the drawheads, are shown.

It will be noticed that one of the peculiarities of this frame is its bracing. The diagonal braces, 6-in. × ⅜-in., shown on the plan, are put on in a simple manner, and the arrangement is one of the particularly good features of design. In some tender frames which we have illustrated in the past these diagonals were cut where they crossed the centre sills, which makes a more expensive construction than the one here shown and one of doubtful advantage.

The longitudinal channels are 10 in. deep, and weigh 57 lbs. per yard. The channel iron body bolsters are 15 in., weighing 120 lbs. to the yard.

This construction is much heavier than that used ten years ago; the increase in strength is a decided advantage, and has been found necessary from experience with the lighter frames. It used to be the custom to make these frames with 6-in. channels, and before the use of the modern heavy locomotive such were sufficient to withstand buffing and pulling strains; but after the introduction of the consolidations they were inadequate hence the use of the 10-in. channels in several recent designs. The 1¼-in. rods, with 1½-in. ends, which pass through from drawhead to drawhead, are quite essential in a tender frame, as the lurching and jerks of heavy engines will otherwise fracture the cast iron brackets which hold the end plates to the channel iron sills.

This excellent design is being extensively built by the Brooks Locomotive Works, and is the form adopted as a standard by several of their regular customers.



IRON TENDER FRAME—BROOKS LOCOMOTIVE WORKS

Foundations of the New London Bridge.

To the engineer the most instructive part of the work of building the Thames River Bridge at New London, Conn., is that which is below the water. The foundations were carried to very great depths, and were built by methods which were not only novel, but expeditious and successful. This work is quite fully described by Mr. Boller in his Report to the General Manager of the New York, Providence & Boston, a review of which appeared in the *Railroad Gazette* of Oct. 10.

From the illustrations which appear in the Report we have selected that showing pier No. 3, the pivot pier, and the following account of the work is condensed from the same publication. The borings at piers 2 and 4 reached solid rock or boulders at depths of 130 ft. and from 100 to 120 ft., respectively, below mean low water. There were deposits of from 60 to 75 ft. overlying the rock. At pier 3 the borings did not reach rock, but were carried into the gravel and boulders at very irregular depths. For reasons which will be obvious it was considered impracticable to make these deep foundations by either the pneumatic process or by open dredging and filling with concrete, because of the uncertainty attaching to concrete so deposited, and the impossibility of starting from a uniformly hard bottom.

The use of isolated cylinders was considered and abandoned on account of the great unbraced depth that there would be from low water to where they could be firmly held in the river bottom, some 70 or 80 ft. It was decided, therefore, to drive piles from 100 to 130 ft. below

water, to cut them off horizontally at from 45 to 60 ft. below water, and to build the masonry in caissons on the top of these piles. The mud was dredged to from 18 to 23 ft. below the river bottom.

The curb constructed as shown in the engraving was then towed to place and sunk. This curb is made of 12 × 12 hemlock timber, thoroughly drift-bolted together. The walls are 8 ft. apart, forming a ballast chamber. The voids between the timber are packed with gravel and stone chips to solidify the mass and gain weight for sinking. The outer walls are 23 ft. deep, while the inner walls are 4 ft. less at the top. The curb for pier 3 is 71 ft. square, with 16 interior cells, 12 ft. square. As the curb finished below the river bottom a temporary framework was carried up from the partition points of the walls, to finish about 1 ft. above high water when the curb was settled in place. The sinking was performed with great success with the aid of a pile-driving machine and falls attached to the fenders, which had been previously built. There was little variation from the true position in sinking the curbs for the three deep water piers. The greatest variation was 8 in. in one direction and 4 in. in the other, while at pier 3 the curb settled to within 2 in. of its correct position. The curb of pier 2 settled 12 in. out of level; those of the other piers from 4 to 10 in. out.

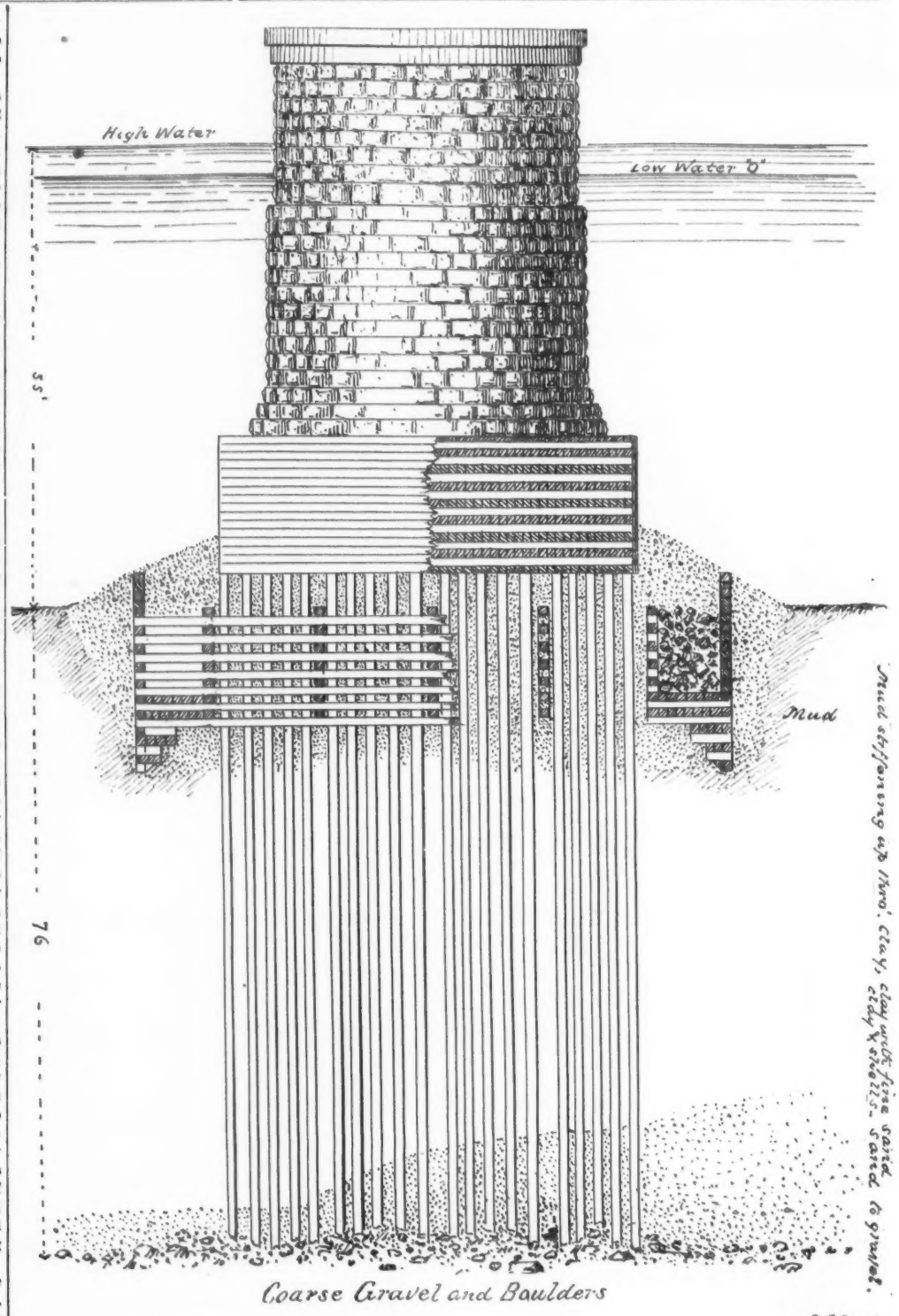
The piles were Michigan white pine and Southern yellow pine, 85 to 90 ft. long, driven to refusal, by a 4,000-lb. hammer. It was designed to limit the weights carried by these piles to 10 tons each. Pier 3 contains 640 piles, 40 in each cell. As these piles were driven 30 to 40 ft. below water a follower arrangement was necessary. This was a steel-ringed, oak follower 16 in. square, with a 2-in. dowell in the end. This was held in the leaders, and the descent of the pile was conveniently controlled under the short blows of the hammer.

Cutting off these piles was a unique job, as no similar work had ever been done in water of such depth; that is, from 47 to 51 ft., according to the stage of the tide. The saw shaft was vertical, of 3-in. steel, backed by two 14 × 14 yellow pine timbers, bolted together to within 8 ft. of the saw. The timbers were slung in the leaders of the pile driver, and hoisted up and down according to the state of the tide. The saws were 50 in. in diameter and ⅝ in. thick. They were driven by a 10-in. belt, direct from a 48-in. pulley on the engine shaft, at a speed of about 400 revolutions per minute. No difficulty, was found in cutting off these piles, but it was quite another thing to find the piles to cut. Divers were sent down and located the piles, and then came up and directed the shifting of the saw. After a little experience the work was done with reasonable speed. As many as 34 piles were cut off in one day, but on other days none were cut off, because of the jamming of the saw or other trouble. After the piling for pier 3 had been cut off the practice was modified. For the other piers the piles were driven in rows, lengthwise of the curb, and each row was cut off as soon as driven before another row was started. To each pile was attached a line, which was fastened to a guide timber, stretching from end to end of the curb and resting on the framework. It was found that by starting the saw at one end of the row and following the line of piles as indicated by the chords the work could be rapidly performed without the aid of divers. Leveling off the tops of the piles was effected by sighting through horizontal slits in level boards fixed on the crib framework or on the fenders, and regulating accordingly the depth to which the saw was sunk.

After the piles were cut off the whole interior of the curbs and ballast chambers was filled with bank sand, intermixed with more or less gravel. The space outside the curbs, between the curbs and the mud, was also filled, partly with sand and partly with material from dredging work which was being carried on up the river. This sand filling was carried 5 to 10 ft. up the side of the platforms for the masonry. The current here is too feeble to scour.

The caisson for pier 3 was 50 ft. square and 50 ft. deep. The platform is composed of 12-in. square hemlock timbers, drift-bolted with 20-in. bolts ⅞-in. square. The final course of the platform is a 6-in. calking deck of creosoted Carolina pine, very thoroughly spiked with 12-in. × ⅝-in. spikes. This is laid in Portland cement mortar, spread over the course below, which in turn is calked with cotton yarn, which swells when wet. The finishing deck is calked with okum. All of the creosoted wood used in this work is impregnated with 14 lbs. of oil to the cubic foot under a pressure of 150 lbs. per sq. in., the timber having been heated to 250 deg Fahr. Dead oil of coal tar was used.

The caisson sides were very stoutly built. The studs were 6 × 12 yellow pine, 2 ft. centres, boxed 2 in. into the calking deck. The corner posts were 12 in. square. The rods were 1⅛ in. diameter, placed between every alternate pair of studs. The siding consisted of 2-in. plank well calked. All of these caissons proved very tight. A small steam syphon run for a few minutes took care of the little water that leaked through. The sides were detached and floated off after the masonry was in place. The sides of the caissons were fixed at 35 ft. above the platforms as being the practicable height over which to hoist the stone for the masonry. Mr. Boller had designed to build these sides in two stories, erecting the second after the first had been sunk to within 5 ft. or so of the top. This was changed at the request of the sub-contractor for this portion of the work, and a door was used in the upper portion of one of the sides, for about one-third of its descent, through which to hoist the stones. The contractor admitted, however, that the double story plan would have given him less trouble and anxiety.



PIVOT PIER OF THE THAMES RIVER DRAWBRIDGE, NEW LONDON, CONN.

Mr. A. P. BOLLER, *Chief Engineer.*

Owing to the depth of the caisson bottoms, much care was required in their sinking to prevent them toppling over. In addition to falls attached to either side, an extra derrick was employed for handling balancing stones. The moment a stone was being set its weight was balanced by another stone on the opposite side.

When the masonry of the pivot pier was up it was loaded with 2,700 net tons of pig iron, reaching a height of 27 ft. The settlement under this load was 4¾ in. This, with the settlement due to the masonry, makes a total of about 7 in.

The Pittsburgh Works of the Schoen Manufacturing Company.

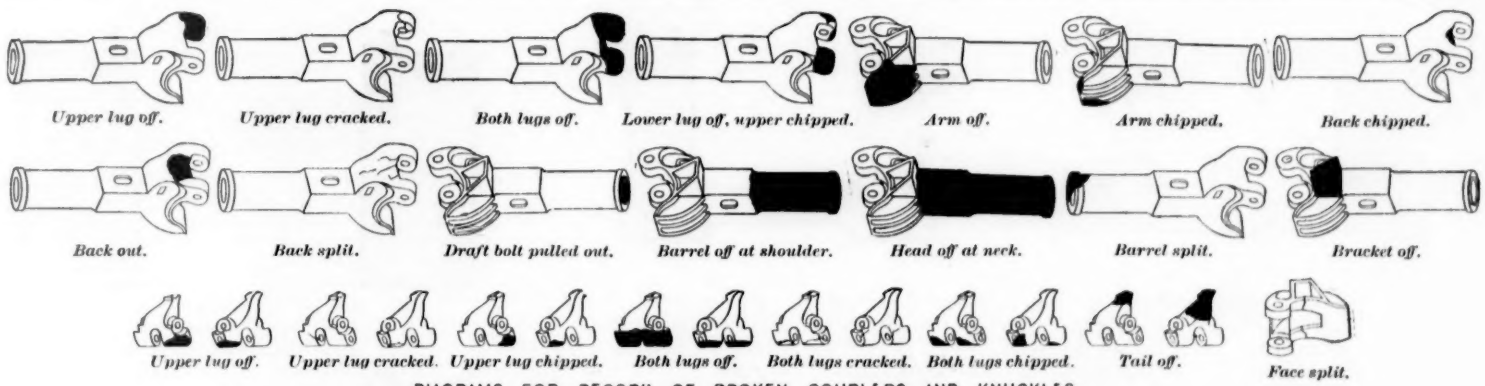
One of the most important features in the present development in car construction is the introduction of pressed steel shapes in the place of castings. Many special parts are now used, but they are nothing in number and variety to what we are sure to see very shortly. The advantages theoretically are so manifest when we stop for a moment to consider the question that one wonders at the delay in developing this industry. Mr. Chas. T. Schoen became deeply interested in this subject some three years ago and he organized the Schoen Manufacturing Company for the purpose of developing the business. The company has been adding with great rapidity to the list of articles it manufactures. The business has outgrown the works in Philadelphia. Foreseeing this, the company has been the past year building a plant at Pittsburgh. This point was chosen because of its central location for shipping, and because of its advantages in the matter of raw material.

The main building of the new plant is 90 × 200 ft., built entirely of iron and steel, and is floored throughout with a steel floor, which is a very interesting novelty. The machinery of the new plant is nearly all of special design, suited especially for the business. The hydraulic machinery is driven by two duplex hydraulic engines, with an immense accumulator, working under a pressure of 1,500 lbs. per square inch. The other machinery is driven by a 100 H. P. Buckeye engine. In addition there are four steam drop hammers. Everything is arranged so that the work can be handled in the most economical manner.

In addition to the main building there is one for machine and die work; also a two-story office building, the whole probably making the most complete plant for this class of work that has ever been built. The capacity of the works, when in full operation, will be about 80 tons per day. The company has just issued a fine catalogue of the articles it manufactures. The address of the company hereafter will be Pittsburgh, Pa.

Life of the Janney Coupler.

We give herewith some very interesting and important tables, drawn from the records of the McConway & Torley Company, makers of the Janney coupler. The tables show in detail the breakages of knuckles and of



DIAGRAMS FOR RECORD OF BROKEN COUPLERS AND KNUCKLES.

couplers proper, and the roads from which the most important returns were received. The diagrams serve to explain the classification. These data are discussed at some length on the editorial pages, therefore we will merely say here that the returns are from 124,441 couplers of an average life of 12.27 months, and that they are brought up to Oct. 11, 1890. The ratio of breakages has been equated to one year of average service. No record nearly so comprehensive has ever been published before.

TABLE I.

Janney couplers broken from a total of 124,441 in service 12.27 months, to Oct. 11, 1890.

How broken.	Number broken.	Number broken for one in service.
Upper lug off	79	.00063
" " cracked	5	.00004
" " chipped	..	....
Lower lug off	17)	.00137
" " cracked	4	.00003
" " chipped	..	....
Both lugs off	110	.00088
" " cracked	..	...
" " chipped	..	....
Upper lug off, lower cracked	1	.00001
Lower " " upper "	1	.00001
Upper lug off, lower chipped	..	....
Lower " " upper "	1	.00001
Arm off	931	.00748
" cracked	29	.00023
" chipped	86	.00069
Face split	67	.00054
Back chipped	9	00007
" out	19	.00015
" split	305	.00245
Draft bolt pulled through	74	.00051
Barrel off at shoulder	317	.00255
Head off at neck	97	.00078
Barrel split	11	.00009
Bracket cracked or off	19	.00015
Burnt	7	.00003
Worn out	9	.00007
No defect observed	87	.00069
Miscellaneous	1	.00001
	2,439	.01959

TABLE II.

Janney knuckles broken from a total of 124,441 in service 12.27 months, to Oct. 11, 1890.

How broken.	Number broken.	Number broken for one in service.
Upper lug off	1,939	.01558
" " cracked	576	.00463
" " chipped	1,198	.00962
Lower lug off	406	.00326
" " cracked	128	.00103
" " chipped	144	.00116
Both lugs off	502	.00400
" " cracked	46	.00032
" " chipped	412	.00331
Upper lug off, lower cracked	56	00045
Lower " " upper "	25	.00021
Upper lug off, lower chipped	218	.00175
Lower " " upper "	230	.00185
Tail off	87	.00069
Worn out	57	.00046
No defect observed	11	.00009
Miscellaneous	27	00021
	6,056	04866

The proportions of broken parts as above, equated to one year are: Couplers, 0.01916; knuckles, 0.0476.

TABLE III.

Distribution by companies of couplers from which the records in Tables I. and II. are taken:

From whom.	Total number in service.
New York, Lake Erie & Western	10,592
New York Central & Hudson River	2,675
*Cleveland, Cincinnati, Chicago & Indianapolis	....
West Shore	430
Lake Shore & Michigan Southern	4,993
Pittsburgh, Cincinnati & St. Louis	6,424
Wilmington, Columbia & Augusta	504
Richmond & Danville	8,386
Pennsylvania	13,945
Chicago, Rock Island & Pacific	4,816
Philadelphia, Wilmington & Baltimore	1,282
Pennsylvania Company	6,011
New York, Chicago & St. Louis	762
Western New York & Pennsylvania	650
Chicago, Burlington & Quincy	6,736
Pittsburgh, Fort Wayne & Chicago	446
Cleveland, Cincinnati, Chicago & St. Louis	4,833
Canda Cattle Car Co	4,672
Baltimore & Ohio	1,294
Miscellaneous	45,580
Total	124,441

* Included with the C., C., C. & St. L.

The United States Automatic Block Signal.

The illustrations printed herewith show the principal details of a new automatic electric block signal introduced by the United States Electric Railway Signal Company, of Chicago. In this system the track instrument is placed about 1,000 ft. in advance of the signal, so that the entire train may pass the signal before operating it, thus keeping the last block passed through protected until the entire train has passed out of it. The signal case is made of substantial iron castings which afford complete protection from weather. It is mounted upon a tower built of wrought iron piping, well braced. These towers stand upon heavy cast iron foundations which penetrate the earth 5 ft. and are provided with spaces for a storage battery of sufficient capacity to supply current for six months without recharging. A single line of wire, incased in iron pipe and put underground, is provided for each track, but is so arranged that no two towers are connected except when one shows the red or danger signal; then it is automatically paired with the one ahead.

The case, fig. 1, is provided with a circular double window 9 in. in diameter, which affords an unobstructed view through when the signal is clear, but when in the danger position a red transparent disc H^1 is moved over and completely covers the window, making it appear red. A lamp is placed behind this window at night.

The track instrument, fig. 2, consists of a square iron box fitted to the rail and so constructed that it requires the weight of an engine or a very heavy car to operate it, as it gets its motion from the slight depression of the rail, and is therefore not subject to the violent usage received by instruments that are acted on by the tread of the wheels direct. Inside the box B is a crankshaft G, near one end of which is loosely fitted a ratchet-wheel M, which is insulated therefrom. The pin H of the crank engages a bar of iron I, 8 ft. long, which lies in the hollow side of the rail between the rail and the box, and is supported at the ends only, which arrangement admits of the rail springing downward directly where the box is fastened to it, and carrying the box along with it without springing the bar I. This relative change of position of the box and bar imparts an oscillating motion to the crankshaft. On the end of the crankshaft, next the ratchet wheel, is fastened a lever N, which carries an insulated spring pawl, which engages the teeth of the ratchet-wheel M, and imparts a rotary step-by-step motion thereto when the rail springs down and up. Two flat springs (one of which, D, is insulated) are fastened to the body of the box and also engage the surface of the ratchet-wheel, as shown at X X. To the insulated spring D is fastened the wire, and from this point the circuit is completed through the ratchet-wheel to the other spring, and from it to the body of the box, thence to ground. The momentary opening of the circuit by the snapping off of the springs produces the change in the signal to be described further on.

Fig. 1 is a diagram showing three signal towers. Referring to the middle one, we find the disc H withdrawn from sight, and hence the signal is clear. The red disc is attached to the lower end of a pendulum as shown. This pendulum is connected by a short rod or link to a double rocking armature pivoted in its middle, and capable of being attracted toward either of the electro-magnets R or Q. As shown in the middle signal, the rocking armature is attracted by Q, hence the pendulum is drawn to the left, and the red disc H with it.

Each signal has its own local circuit, which is always closed, and a battery. The circuit runs as follows: commencing at the + side of the battery it runs to one of a pair of contact points in the relay W, thence through the coils of electro-magnet Q, thence to the track instrument, thence to ground. Beginning now at the — side of the battery, the circuit runs to the other contact point of relay, thence through electro-magnet R, thence to ground by fastening to the case. The relay W is polarized and provided with a rocking armature capable of being thrown in either direction, according to the direction in which a current is sent through its coils. To the rocking armature of the relay is attached a tongue which rests on one or the other of the contact points before mentioned, and to this tongue is connected a ground wire. It will be apparent that this tongue will "ground out" or short circuit one or the other of the electro-magnets Q or R. In the middle signal R is grounded out, and the current, after passing through Q and the track instrument to ground, returns

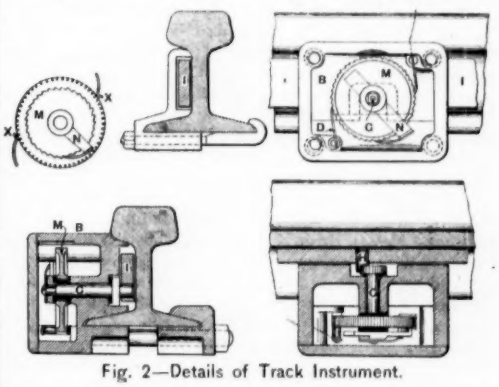
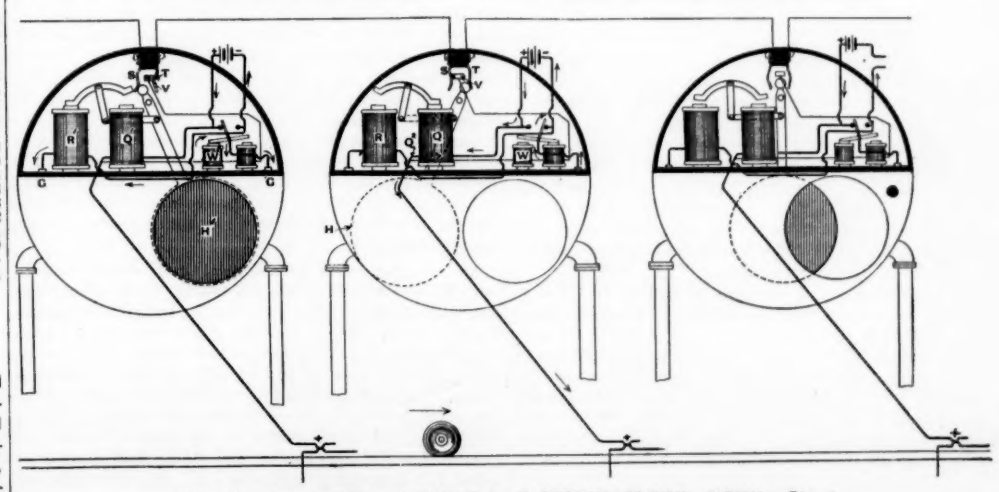


Fig. 2—Details of Track Instrument.

to the battery from the ground through the relay ground wire and armature tongue. Connected to the primary wire as described above, between the electro-magnet Q and the track instrument, is a branch wire (Q^2), which runs to the inside of the relay coils and thence out to a contact block v. On each side of contact block v are contact springs S and T. These springs are so formed that when nothing interposes, and they hang free, they touch each other,* but if one is slightly pushed away from the other the one *not pushed* will rest on the contact block v. In the middle signal the spring T is pushed off by a pin in the upper end of the pendulum rod and spring S makes contact with contact block v. To the spring S is connected the line wire running back to the next signal, where it connects to the spring T of that signal. Now this signal is in the "danger" position and shows red, and the pendulum hangs at the other extreme, hence the spring S is here pushed off and T allowed to make contact with the contact block v. A wire runs from contact v to relay and from relay to branching

* This should be their position in the right-hand signal; the drawing erroneously shows them apart.



THE UNITED STATES AUTOMATIC ELECTRIC BLOCK SIGNAL—Fig. 1.

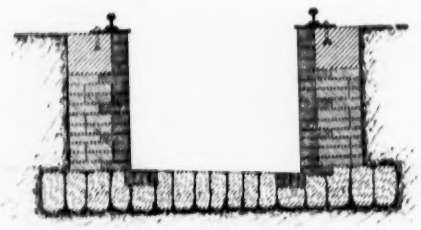


Fig. 1.

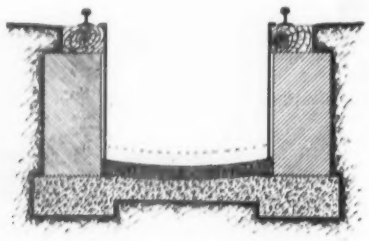


Fig. 2.

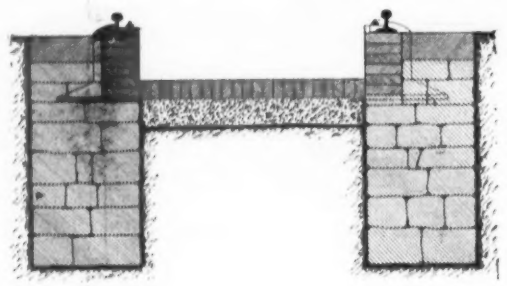


Fig. 3.

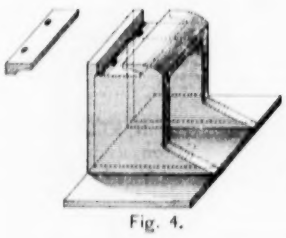


Fig. 4.

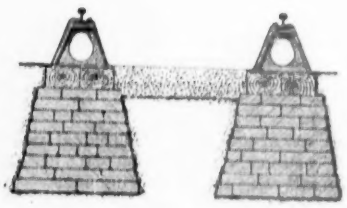


Fig. 5.

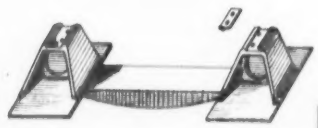


Fig. 7.

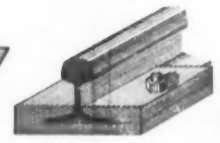


Fig. 12.

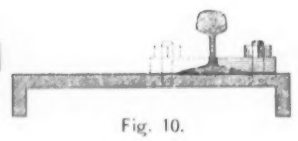


Fig. 10.

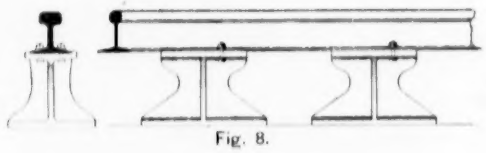


Fig. 8.

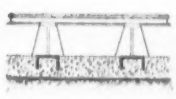


Fig. 6.

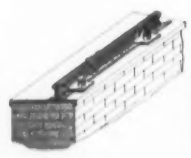


Fig. 9.

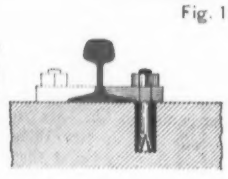


Fig. 11.

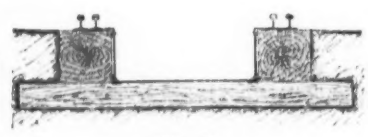


Fig. 13.

DETAILS OF VARIOUS STANDARD ASH PITS.

place in primary wire precisely the same as in the middle signal (Q^2). It is evident that a current sent through the line wire will have the opposite effect upon one relay to what it has upon the other.

The relays are operated by the electro static discharge, or extra current as it is sometimes called, caused by a momentary opening of the closed primary circuit. This discharge, though small in quantity, is of high electro-motive force and capable of overcoming high resistance.

Suppose, now, an engine to be where the wheel is shown, going in the direction of the arrow. When it passes over the track instrument of the middle signal it causes a momentary break in the circuit. This causes the extra current to pass through the branch, starting at Q^2, through the relay, through the line wire back to left-hand signal, through its relay, through branch to primary wire, through primary wire to ground, through ground back to middle signal, through middle signal's primary wire to branching place, thus completing the circuit. The effect will be to reverse the position of the relay tongues in both signals and thus change the current to the idle electro-magnets in both, and restore the left-hand signal to safety and throw the middle one to danger.

Should the local circuit become inoperative from any cause such as exhausted battery or broken wire the red disc will show *one-half*, which is an indication distinct from either danger or safety; this is shown in the right-hand signal. When this takes place the springs S and T come together and close the line. This enables the next signal to act in place of the disabled one and prevents delay.

This signal has been in operation on the Wisconsin Central in Chicago for three months, where it is said to have worked perfectly. The company, whose president is Mr. W. B. Sterrett, has its office in the Grand Pacific Hotel, Chicago. An arrangement of signals is also provided for single track blocking.

Buildings and Structures of American Railroads.*

NO. 8.—ASH PITS.

BY WALTER G. BERG.

Ash pits or clinker pits are required along the main line of a railroad and at terminal and division yards, shop and roundhouse systems, to allow ashes and clinker-collecting in the fire boxes of engines to be dumped, and also, although to a more limited extent, to facilitate the examination and oiling of the engine machinery from below at points where stops are made. It is customary to prohibit the dumping of ashes on the track along the line of the road, and the cleaning of the fire boxes at special ash pits is made compulsory. The general design of ash pits is very similar to that of an engine house pit, excepting that the paving and side walls must be protected in some manner from the deteriorating influence of hot ashes, and proper provision should be made for the economical and quick disposal of the ashes as they accumulate.

The location of ash pits varies according to whether they are in the main track, or on principal sidings along the line, or at division yards, shop or roundhouse systems. When placed in a main track the pits are usually short and located near stations, water tanks or coaling platforms, in such a manner that the ashes can be quickly dumped while the engine stops for other purposes, and thus avoid extra delays. At large coaling systems for coaling engines preparatory to starting out on the road, at water stations, or at yard or shop systems, ash pits are placed so as to be readily accessible at all times from some open track. These pits are made much longer than those placed in main tracks, in order to enable a number of engines to use the pit at the same time. Where an ash pit is located in a main track it is absolutely essential to have a siding alongside for use as an ash car track, to allow ashes to be loaded on cars without causing detentions to main line trains.

The length of an ash pit varies according to its location, as outlined above, and according to the relative objections that may exist to requiring engines to wait their turn to use the ash pit. The quality of coal has also an important bearing on the question, as inferior grades of coal produce a much larger percentage of ash and clinkers, and hence larger pits are required. Where a large number of engines are liable to require the use of an ash pit at the same time, as, for instance, at the close of a day's business, or preparatory to starting out a number of trains in close succession, due provision should be made to give quick dispatch to the engines.

The width of the pit is governed by the gauge of the track, the style of the coping on the side walls, and the method of fastening the rails to the coping. As a rule, however, the width of the pit is from 4 ft. to 4 ft. 3 in. in the clear, being narrower on main tracks than on side tracks, so as to give more stability to the side walls where there is fast running. The extra width is valuable, not only to gain storage room, but also to facilitate working under the engine in oiling and making light repairs.

The depths of pits vary considerably, but we can distinguish between two systems in use, namely, shallow pits and deep pits. Shallow pits are made from 14 to 16 in. deep below the top of rail, while deep pits are from 3 ft. to 4 ft. deep below the top of rail. Shallow pits are only used where sufficient help is always on hand to remove the ashes promptly. If this is not the case, the length must be increased. Shallow pits are preferable in main tracks. Deep pits afford better storage and facilitate working under the engine. There are other questions dependent on local circumstances that may influence the depth of an ash pit.

It is desirable to have a water connection near the ash pit to allow the ashes to be cooled with water, so as to reduce their deteriorating effect on the pit and to allow the pit to be cleaned out sooner. While in one sense it is detrimental to play large streams of water on the masonry and paving in the pit, it is probably better to kill the fire promptly than to allow the heat to thoroughly penetrate the masonry.

The ends of the pits are generally built square. Steps or inclines can be introduced, where pits are deep, to facilitate getting into them or wheeling material out endways. This feature has, however, never been considered of sufficient importance in this country to warrant its adoption.

An ash pit located on a special track should be connected at both ends with open tracks, so that engines can leave the pit without interfering with other engines back of them. Where feasible, there should be a special depressed ash car track alongside of an ash pit, so as to bring the car floor nearly on a level with the ash pit track. This siding should be close enough to the pit to allow ashes to be cast from the pit on to the car; but, on the other hand, there should be as much of a berm as possible left between the ash car siding and the pit to serve for depositing ashes in case ash cars are not available.

Further general distinguishing features of ash pits can be found in the construction of the side walls, which are either closed or open. Ash pits with closed sides have the disadvantage that they can be cleaned only when the track is clear, while pits with open sides can obviously be cleaned at all times, the ashes being either cast or drawn out between the iron rail chairs, which is quite an essential feature where an ash pit is located on a much traveled track.

In designing an ash pit the distinctive features to be considered are foundations, side walls, coping of side walls, rail fastenings, paving, drainage, and the protection of the side walls and paving from the heat.

In building the foundations the usual rules for that class of work are followed, especial care being paid to give good foundations, particularly where rail chairs are used, as the heavy concentrated loads on the chairs and the vibratory effects of rapidly passing trains, in addition to the deteriorating action of the heat and water, will soon destroy inferior work. The materials in general use for foundations are concrete, stone rubble work or stone paving grouted with cement.

The side walls are usually built of stone or hard brick, from 18 in. to 24 in. thick, laid in cement mortar. It is desirable not to have too thin a wall, and all the materials should be of the best make possible, for similar reasons to those just recited for foundation work.

The coping of the side walls is made of large stones, timber stringers or iron plates. Where coping stones extend over the full width of the wall, it is not necessary to anchor them to the side walls below them; but, where the stones are small they should be anchored to the wall and tied together with iron clamps. Timber coping should be fastened to the wall under it about every 5 or 6 ft. with iron anchor bolts. Where wrought or cast iron coping plates are used, special coping stones are not required. The coping should always be properly secured in place, so as to prevent the rails spreading. In some designs transverse walls are provided at intervals to tie the side walls together, or iron tie rods and braces are used in place of transverse walls.

The rail fastenings vary according to the kind of coping used on the side walls. On timber coping the rails are either fastened in the usual manner with track spikes with reversed heads (bridge spikes), or with screw spikes, or the rail is riveted to a wrought iron plate, which plate is fastened to the timber coping, about every 5 ft., with bolts or dowels, as shown in fig. 1. Where a cast or wrought iron plate is used as coping, covering the top wall entirely, the rail is fastened to it by means of screw bolts and small clips. Where stone coping is used the rails can be fastened by ordinary track spikes driven into wooden dowels, about 2 in. in diameter, bedded in holes drilled in the stone. Another form of connection to stone coping is by bolts or split bolts with keys, set with cement, lead or sulphur in holes drilled in the coping, the rail flange being caught by an appropriate clip, as shown in fig. 11. Another method, shown in fig. 12, is to use regular bed plates or clip plates under the rail, spaced at intervals of 3 to 4 ft., and properly fastened to the stone coping with bolts or split bolts, as above described. Where iron rail chairs are used as rail supports and fasteners, they are either small cast iron chairs, about 8 in. high, bedded in the side walls and spaced about 4 ft. apart, as shown in fig. 8, or large cast iron chairs spaced about 3 to 4 ft. apart, the side walls being either walled up between the chairs, as shown in figs. 3 and 4, or left open, as shown in figs. 5, 6 and 7.

*Copyright 1890, by Walter G. Berg, and condensed from a forthcoming book on the subject.

The paving usually consists of brick or stone, although concrete is sometimes employed. The material under the paving should be carefully tamped and consolidated, and a sublayer of concrete under brick or stone paving is to be recommended. Fire brick pavement resists the heat better than common hard brick, but it is soon worn out by the shoveling and from men working on it. Some roads, therefore, prefer to use common hard brick, which is easily and cheaply replaced when necessary. Stone flagging, unless well bedded, is easily broken, and, therefore, not desirable. Ordinary rough stone paving, such as is generally used under box culverts on railroads, is too rough for shoveling, if the bottom of pit is to be kept clean. City paving blocks are generally too expensive, and do not present a much better surface to shovel on than ordinary paving stones. A concrete bottom will soon disintegrate on the surface and, once started, will grow rapidly worse. A pavement of common hard brick, set on edge, and laid on a good foundation or in a bed of concrete, will prove most desirable in the long run.

To secure proper drainage of the pit, the paving is dished transversely and pitched longitudinally, the grade being arranged, according to the length of the pit, so as to drain toward one end of the pit, or from each end toward the centre, or from the centre toward the ends, or toward several points. The transverse dishing of the paving is usually in the form of a general depression, about 2 in. deep, from the sides toward the centre of the pit. Another method is to make the bottom straight transversely with a pitch toward one of the side walls, forming a gutter along the side wall; or the paving is built highest at the centre of the pit and pitches down toward each side wall, forming a gutter along each side wall. The dishing of the paving toward the side walls has the advantage of keeping the centre of the pit dry, but it has the objectionable feature of throwing the water against the side walls. The system of making the gutter at the centre of the pit is to be recommended, provided the dishing and curvature are not made so heavy as to impede shoveling. The longitudinal gradient of the paving must be sufficient to secure proper drainage lengthwise of the pit, and should be not less than 1 ft. in 100 ft. for brick pavement and more for rough stone paving. Large and well designed sinkholes or catchbasins should be built either inside or outside of the pit, preferably the latter, as they can then be larger and covered up in such a way as to be readily opened and cleaned out. Iron gratings at all drainholes are essential so as to prevent, so far as possible, dirt and ashes carried along by the water from clogging up the drains. The drain leading from the catchbasin away from the pit should be large, especially where a good fall is not obtainable. It can either be an open ditch, a box culvert, a brick sewer or a pipe drain. The cost of an iron pipe, 6 to 10 in. diameter, is from 75 cents to $1.25 per foot run; vitrified pipe will only cost about one-half as much as iron pipe, and a stone box drain, large enough to allow a man to enter it for cleaning it out, will cost from $2 to $2.50 per foot run. Where the length of the drain is short and the fall limited, a box drain will prove the most advantageous.

The protection of the side walls from the deteriorating action of the heat is usually obtained by a facing of fire brick, cast iron or wrought iron plates. Where an iron facing is employed an air space is left between the iron and the face of the side wall, which is a very important element of the design. A cast iron facing of the proper thickness will outlast any other material, but it is liable to crack under the sudden changes of temperature, in addition to the shock from the jarring of passing engines. Wrought iron wears or rusts more quickly than cast iron, especially when exposed to the combined attacks of heat and water. A fire brick facing, if well laid in fire clay and built so as not to receive the weight and jars of the moving load to an appreciable degree, will give good service. Fire bricks are easily damaged, however, by contact with shovels and other tools, and frequent repairs and the subsequent renewal of the facing would be eventually necessary. Where fire brick are not available or too costly, a facing of common hard brick will prove a cheap and efficient substitute for the fire brick, if built so as to allow renewals without tearing down the entire side wall. Ordinary stone or brick walls are doomed to destruction in a comparatively short time. If built, however, of first-class masonry, composed of large, through stones, well jointed and bedded and of a good heat-resisting quality, excellent results can be expected.

Thus far reference has only been made to stone or brick ash pits, or pits with large cast-iron chairs supporting the rails. All iron pits do not seem to have found favor in this country, although, under certain conditions, they have advantages over others that should not be disregarded. This is particularly the case with the general style of a wrought-iron pit, shown in fig. 13, which is practically a shallow wrought-iron pan or trough hung between timber track stringers and resting at the centre on ordinary cross ties under the stringers. If provided with iron guard rails and safety points, or some rerailing device at each end of the pit, this arrangement can be considered as the very best for use in a main track at stations, water tanks or coaling platforms, where trains stop a few minutes and it is desirable to dump a limited amount of ashes. Owing to the small weight of such a pit and the practicability of dividing it into short sections, which are easily handled, it is especially adapted for use on temporary work in the construction of a road, or until the permanent location of the ashpit in connection with the development of a yard or shop system is determined. Such pits are also advantageous where the foundation is very soft or very deep, requiring expensive piling or other methods for supporting a heavy brick or stone wall. The iron trough rests on the usual cross ties placed under a special set of track stringers, requiring, therefore, no extra foundation work. In case of a settlement in the track, the pit can follow without serious damage.

A step in the direction toward iron ash pits has been made in the cinder loading plant of the Cincinnati, Washington & Baltimore Railroad, where the ashes and cinder are caught in iron drop-bottom buckets set into an ordinary stone or brick ashpit. When the track is clear, the buckets are hoisted out of the pit by means of a derrick, swung sideways and emptied on ash cars.

As a final method of comparing the different styles of ashpits, an effort has been made toward estimating the comparative cost of the different designs per foot run of pit, assuming the foundation depth to be about 5 ft. below the top of rail, with the following results: Ordinary brick or stone wall, with stone coping and rails fastened with spikes in wooden dowels, $5; same, with rails fastened with ragbolts, $5.25; same, with rails fastened with iron bearing plates, $5.50; ordinary brick or stone wall, with small cast iron chairs built into the walls or set on top of wall, $6; ordinary brick or stone wall with timber coping and rail fastened to wrought-iron plate over the timber, $6.25; ordinary brick or stone wall with cast-iron or wrought-iron covering over top of wall, $6.75; ordinary brick or stone wall with large cast-iron rail chairs, filled in between the chairs with stone or brick work, $9.25; ordinary brick or stone wall with large cast-iron rail chairs and cast-iron ties across the bottom of pit connecting the rail chairs, the side walls being left open between the rail chairs, $10.75; a shallow, all wrought-iron pit, $6 to $8; a deep, all wrought-iron pit, $9 to $11. For a fireproof protection of the side walls, add about $1 to the above prices. If the bottom of the pit is made of fire brick, in place of ordinary paving, add $1 to the above prices.

As a rule the cost of ash pits with unprotected sides and bottoms can be placed at about $5 to $9 per lineal foot run of pit. If the sides or bottom are properly protected by fire brick or iron in some shape or other, the total cost can be estimated at from $7 to $11 per lineal foot run of pit. If the foundations are not unusually expensive, the cost of ash pits, as actually used on American railroads, can be placed at from $5 to $12 per lineal foot run of pit.

Below will be found descriptions and illustrations of a number of ash pits and details of same actually in use.

Standard Ash Pit, Atchison, Topeka & Santa Fe Railroad.—The standard design for ash pits of the Atchison, Topeka & Santa Fe, illustrated in fig. 1, shows a deep ash pit with side walls of common brick, protected on the face with fire brick, and coped with stone faced with fire brick. The rails are riveted to a wrought iron plate resting in part on the stone coping and projecting over the fire brick into the pit 1 in. The standard size of the pit is 30 ft. long in the clear under ordinary circumstances, 4 ft. 2⅛ in. wide in the clear between side walls, 4 ft. ¼ in. wide in the clear at the top between the projecting edges of the wrought iron plates under the rails, and about 3 ft. 9 in. deep below the top of rail. The foundation of the side walls and the larger portion of the bottom of the pit consist of ordinary stone paving grouted with cement. The side walls are 18 in. thick, built of common brick, coped with stone and faced all the way up with fire brick. In the bottom of the pit there are three rows of fire brick set on edge along each side wall and end wall. The iron foot plate riveted to the rail is ⅛ in. × 12 in., and is anchored to the stone coping with 1-in. anchor bolts every 5 ft. The rivets are spaced 18 in. centres. The fire brick facing is held to the stone coping by ⅜-in. iron bolts set in the joints. The floor of the pit is straight transversely pitching towards one side wall, thus forming a gutter along the latter. The drainage longitudinally is carried from the centre of the pit towards the ends, where drain holes connecting with proper drains are provided.

The approximate cost of this style of pit will range, exclusive of difficult foundations, from about $7 to $8.50 per lineal foot. The protection of the side walls with fire brick is commendable, but the wrought iron plate under the rail is not stiff enough to prevent the transmission of a considerable part of the weight of the moving load to the fire brick facing. The straight bottom and the drain along one side wall is advantageous for shoveling and keeping the pit dry, but will let considerable moisture into the side wall.

Ash Pit at Heron, Mont., Northern Pacific Railroad.—The ash pit at Heron, Mont., on the Northern Pacific, shown in fig. 2, is a deep pit, 84 ft. long in the clear. The width between the side walls is 4 ft. in the clear, the depth about 3 ft. 6 in. from top of rail. The side wall foundations are of concrete, 2 ft. wide and about 1 ft. thick. The side walls are built of common brick, 17 in. thick. The coping timbers or stringers under the rails are 8-in. × 12-in. white pine, anchored to the wall every 6 ft. with ¾-in. bolts, reaching about 3 ft. into the brickwork. The rails are fastened to the timber stringer in the usual manner with ordinary track spikes having reversed heads. The sides of the pit are protected by cast iron plates, ¼ in. thick, 18 in. wide and about 3 ft. 4 in. long, which are hung on the timber stringer by a 3-in. top flange and fastened to same with ⅛-in. spikes. The bottom of these plates is set into the paving of the pit in such a way as to leave a 1-in. air space between the back of the casting and the face of the side wall. The bottom of the pit is paved with common hard brick, set on edge and bedded in an 8-in. layer of concrete. The paving is dished transversely so as to form a gutter, 2 in. deep, at the centre of the pit. The longitudinal drainage is accomplished by giving the bottom of the pit a gradient from each end towards the centre of the pit, where a drainhole through one of the side wall empties into a catch basin, which is covered over and is readily accessible for cleaning.

The cost of this style of ash pit will vary from $8.75 to $9.75 per lineal foot. The drainage of this pit and the cast iron plate protection of the side walls are good features, but the unprotected timber stringers under the rails are liable to require frequent renewals. If a coping of large, well-jointed stones with a proper rail fastening were substituted for the timber stringers, this design could be well recommended for deep pits. In sections of the country where stone is cheap, the brick side walls could be replaced by stone ones, built slightly wider, in which case this design, with the suggested modifications, would be worthy of consideration as a good deep pit standard for permanent work.

Ash Pit at Packerton, Pa., Lehigh Valley Railroad.—The ash pit of the Lehigh Valley, built in connection with the yard and roundhouse system at Packerton, Pa., shown in figs. 3 and 4, designed by J. I. Kinsey, Master Mechanic, L. V. R. R., is a shallow pit with stone side walls, coped with large stone and protected along the inner face with fire brick. The rails are supported on large cast-iron rail chairs, well bedded, and reaching down into the side walls below the bottom of the pit. The length of the pit is 240 ft., the width 4 ft. 1½ in. in the clear between the side walls, and the depth 1 ft. 2½ in. below top of rail. The side walls and their foundations are ordinary rubble masonry. The walls are 2 ft. thick; the coping stones are 16 in. wide. The fire-brick facing is 8 in. thick, and extends from the bottom of the pit to within 1 in. of the base of the rail. The rail chairs are spaced 5 ft. centres along each rail. The base plates of these chairs are 24 in. × 18 in., and are set 19 in. below the top of rail. The space between the two upright ribs of each rail chair is filled with fire brick on the face and backed with ordinary rubble masonry, so that the only iron along the face of the pit directly exposed to heat is the outside edge of the ribs mentioned. The rail is held in the chair by a clip and screw bolts, as shown. The paving consists of fire brick set on edge and bedded on a light layer of concrete. The bottom is concave transversely, the centre being about 2 in. lower than the sides. The ash pit track has a gradient of about 30 ft. to the mile and the rail chairs had to be set accordingly. The drainage of the pit follows the down grade of the track, but the fall is made slightly steeper. At the low end of the pit the water passes through a drain hole in one of the side walls into a large, well-designed catchbasin, from which a stone box drain leads to the low ground in the neighborhood.

The cost of this style of ash pit is from $9.75 to $11.25 per lineal foot. Though costly, this design possesses a number of good features for a shallow pit where permanency and a solid and lasting bedding for the rails is desired. Owing to the comparatively wide spacing of the chairs under each rail, it is essential that the masonry be well built under the chairs. Practical experience in this instance proves that the fire brick facing of the sides of the pit stands fairly well, probably owing to its thickness and also to the fact that it carries none of the weight of the moving load. The fire brick paving was not a success, however, as it gave out very soon, owing to walking and working on top of it, so that it would be more economical to have used common hard brick. With certain modifications, therefore, this style of ash pit embodies the general features to be observed in a standard shallow ash pit.

Ash Pit at Aurora, Ill., Chicago, Burlington & Quincy Railroad.—The style of ash pit in use at Aurora, Ill., and at other points on the Chicago, Burlington & Quincy, shown in figs. 5, 6 and 7, designed by Mr. William Forsyth, Mechanical Engineer, C., B. & Q. R. R., is a shallow pit without side walls above the bottom of the pit, the rails resting on large cast iron rail chairs, the space under the rails between the chairs being left open. At large roundhouse and shop systems the length of the pit is made 200 ft., and at some points on the line two or three pits of that length are required, where there are a large number of engines to be provided for, which burn a low grade of coal producing a large percentage of ash and clinkers. The pit is about 4 ft. 3 in. wide at the top of the rail chair and about 3 ft. 6 in. wide at the bottom; the depth is 16½ in. below the top of rail. The foundations and side walls up to about 7 in. below the floor level of the pit are of ordinary stone work, over which there is concrete. Each side wall is coped with two longitudinal oak stringers, each 6 in. × 10 in. The iron rail chairs are set on these timbers, the top of the bed-plate of the chairs being flush with the floor level of the pit. The chairs being spaced 3 ft. centres and the base being 2 ft. long, 1 ft. of the timber stringers between the chairs has to be protected by wrought-iron plates. The greatest peculiarity of this design is the use of the large cast-iron rail chairs, set in pairs opposite each other, the bed-plates being connected by a channel-shaped tie across the floor of the pit, the whole being cast in one piece. The top of this tie is flush with the top of the bed-plates, and hence even with the floor level of the pit. The rails are held in the chairs by clips and screw bolts, as shown. The pit being open on both sides and the floor level, the drainage takes place sideways, provided the ground slopes away from the pit, or proper ditches or drains are constructed outside of the pit.

The cost of this style of ash pit, or clinker pit, as it is called on the C., B. & Q., is from $10 to $11 per lineal foot, exclusive of unusual foundations. Mr. Wm. Forsyth states that this style of pit is giving very good satisfaction on tracks where there are no fast trains run. Without a doubt, this design offers great advantages in not having side walls exposed to the heat, in having all iron work subjected to the action of the heat visible and open for inspection, and especially in being able to clean the pit from the sides even when engines are occupying the track.

Rail Chair, Savannah, Florida & Western Railroad.—Fig. 8 shows a form of rail chair used in engine house pits and ash pits on the Savannah, Florida & Western, designed by Mr. W. B. W. Howe, Jr., Chief Engineer. This chair is about 8 in. high and is built into the brick or stone side walls at intervals of about 4 ft. The base is about 8 in. × 12 in., and the thickness of the ribs about ⅝ in. The rail is fastened to the chairs with screw bolts. The weight of one chair is about 40 lbs. This design is presented as illustrating a method in actual use for bedding rails on top of side walls of pits, but it does not offer any distinctively commendable features.

Ash Pit, Lehigh & Susquehanna Railroad.—In figs. 9 and 10 is shown a style of ash pit in use on the Lehigh & Susquehanna, near Walnutport, Pa., having ordinary rubble masonry walls covered with cast-iron channel-shaped coping plates, to which the rails are fastened with screw bolts and appropriate clips. The length of this pit is about 30 ft., with a cross wall connecting the side walls at about the centre of the pit to prevent the side walls

from bulging, as the pit is built in the main track. The cost of this style of pit is about $6 per lineal foot.

Ash Pit Cinder Loading Plant, Cincinnati, Washington & Baltimore Railroad.—In connection with ash pits a noteworthy labor-saving device for handling ashes at ash pits has been designed and built at Chillicothe, O., for the Cincinnati, Washington & Baltimore, by Edward Evans, Master Mechanic. According to the *Railroad Gazette* of June 6, 1890, the crane is located between the ash pit track and another track where a gondola car is kept for receiving ashes, which are raked out of the ash pans of engines directly into a sheet iron box, about 8 ft. long, and in width the same as the distance between the walls of the pit. This box, when full, is lifted by the crane, and after being swung round so as to be over the gondola, its hinged bottom is tripped and the ashes drop into the car. The lifting chain of the crane passes down the centre of the mast and round a sheave at its foot, and can be either operated by a winch or attached directly to an engine. The saving in shoveling is obvious, and when a track can be reserved for gondola to receive the ashes, the utility of the design is assured.

Three-Lever Machine for Signaling and Locking Drawbridges.

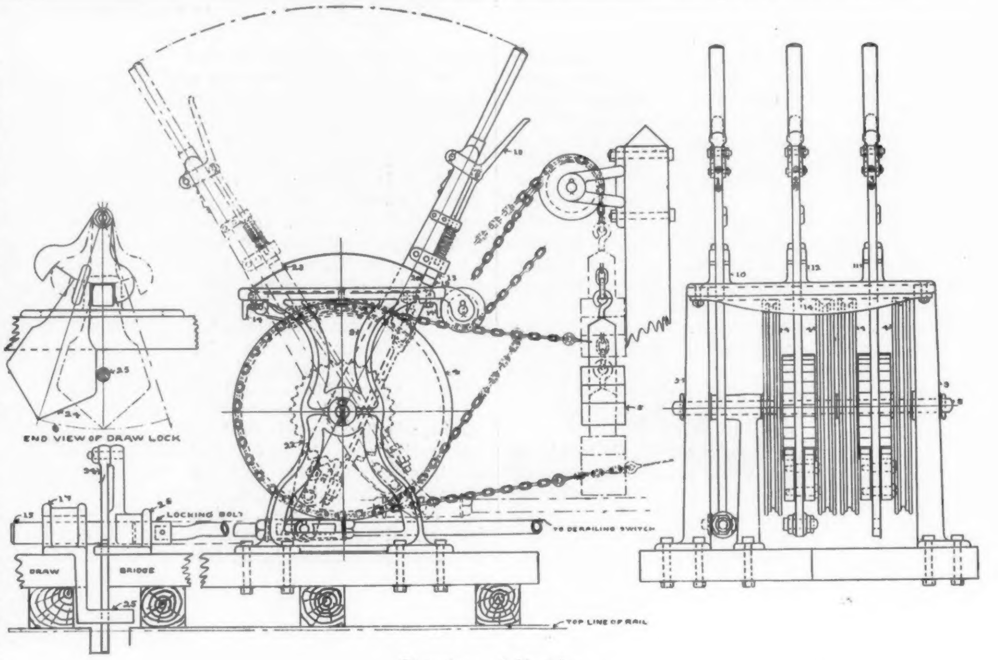
A year or two ago we illustrated the Kelsey drawbridge signal as in service on the New York, New Haven & Hartford at the Middletown drawbridge. The three-lever machine illustrated here is a development of the same idea.

The distant signal is operated by lever No. 3, the home signal by No. 2, the derailing switch, detector bar and drawbridge lock by lever No. 1. The signals are operated by wire connection by chains running over the sheaves attached to the levers. The connections from lever No. 1 are made by pipe. Contraction and expansion of the wire connections are provided for by a weight attached to the chain passing over the sprocket wheels, the weight being indicated at 5 and the wheels at 4 in the elevations. When the levers are normal the sprocket wheels are free to turn and the weight keeps a uniform tension on the wire. The locking of the machine is preliminary but is not explained by the inventor.

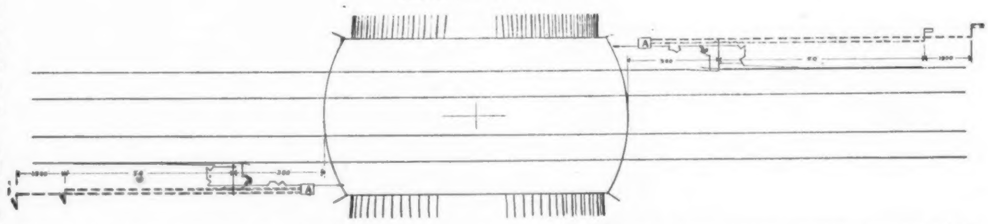
By raising the spring latch which engages in the quadrant the pawl 21 engages in the ratchet 22, and through this engagement motion is communicated to the sprocket wheels. By the stroke of lever No. 1 the derailing switch is opened before the drawbridge lock bolt is fully withdrawn.

In the end view of the draw lock is seen the arrangement by which a plate falling in front of the locking bolt keeps it from being shot while the draw is open. This plate is pushed aside by the projecting pin 25 when the draw is closed.

This machine is furnished with from one to ten levers, with single or double wire compensators. The various wearing parts are cold rolled steel. The height of the three-lever machine from top of quadrants is 27 in., the width over all 19½ in.



Elevations of Macnine.



Signals clear, derailer closed, draw locked. *Signals at danger, derailer open, draw unlocked.*

Plan of Drawbridge.

THREE-LEVER GROUND MACHINE FOR SIGNALING AND LOCKING DRAW BRIDGES.

Made by the KELSEY RAILROAD SIGNAL CO., *Florence, Mass.*

Steel Tired Wheels and the Principles to be Followed in Attaching the Tire to the Centre.*

The subject of steel tired wheels is an important one, and much may be said about it from various aspects, but we will ask you to consider it this afternoon chiefly from two standpoints: first in connection with locomotive driving wheels and next with the smaller wheels used in the trucks of locomotives, tanks and cars.

On every road each year there is a record made of more or less broken tires and consequent damages. We are now approaching that period of the year when, owing to the frozen condition of the roadbed, the liability to breakages is apt to increase. On the Chicago, Burlington & Quincy, with 469 locomotives, from June 1, 1889 to June 1, 1890, there were thirteen broken or cracked tires, the detail of which is given in the table:

STATEMENT OF BROKEN DRIVING WHEEL TIRES ON LOCOMOTIVES OF C., B. & Q. R. R. FROM JUNE 1, 1889, TO JUNE 1, 1890.

No. of engine.	Division.	Kind of service.	Make of tire.	Date put on.	Date when broken	Thickness when put on.	Thickness when broken.	Total mileage.	Cause of removal and consecutive number.
295	West Iowa.	Pass.	B	6-'85	6-'89	4	2 10-16	163,173	Broken Flange. (1)
446	Chicago.	Switch.	A	7-'84	6-'89	4	1 21-32	150,536	Broken (2)
458	Galesburg.	Freight.	B	2-'85	9-'89	4	2 13-16	194,886	Broken Flange. (3)
18	"	Switch.	C	3-'86	2-'90	4	1 27-32	103,723	Broken. (4)
61	East Iowa.	"	A	8-'81	2-'90	3	1 13-32	261,967	" (5)
244	"	"	A	8-'81	2-'96	3	1 15-32	245,308	" (6)
18	Galesburg.	"	C	3-'86	3-'90	4	1⅛	107,900	" (7)
120	"	Freight.	B	1-'85	3-'90	4	2 17-32	208,898	" (8)
448	"	Switch.	A	10-'87	3-'90	3	1 7-16	111,993	" (9)
96	St. Louis.	Freight.	A	7-'85	3-'90	4	2 3-16	172,540	" (10)
120	Galesburg.	"	B	11-'83	4-'90	4	2 5-16	192,426	" (11)
120	"	"	B	11 '83	5-'90	4	2 11-32	145,870	" (12)
6	Chicago.	Switch.	A	3-'86	5-'90	4	1½	178,029	" (13)

In the table the different makes of tire are indicated by letters. The thickness of each tire at date of breakage is given, with the total mileage. It will be noted that 6 tires failed above 2 in. thick and 7 below 2 in. We have on the table for your inspection small sections from seven of these tires, etchings from which have also been taken and are represented in figs. 3 to 9. [The engravings referred to are omitted, plates not having been received when we go to press.—EDITOR.] The sections are much more interesting than the reproduced etchings. Not only do the sections show the original fracture on one side, but also the etched plate as near to it as possible on the opposite side. Take for example tire No. 4, fig. 3. No imperfections are observed in the fracture, unless it may be doubtful indications at the flange, and yet see how clearly the etched plate brings out the "blow holes," "cold shorts" or "wells," as these defects are variously termed.

Tire No. 8 is defective in the flange. Immediately under the surface of the throat, but not apparent from the outside, for a vertical distance of ⅛ in., the metal has never been united; at the bottom of the flaw its direction turns at a right angle inward and a distinct crack in the metal extends in a horizontal line clean through the flange.

In tires 9 to 13 are well defined flaws at the rims. It may be difficult at first, perhaps, to fully decide whether these flaws were inherent defects in the tires or whether they were produced by the act of breaking. To our mind there is hardly a shadow of doubt but that the well defined flaws referred to were in the tire from the time they were manufactured.

Tires 10, 11 and 12 are defective mainly at the flange, which is indicated by the spongy appearance of the section.

We now come to our last sections, shown in figs. 12 and 13. These tires are 4 and 4¼ in. thick respectively; they have never been in service, having been condemned on inspection for surface imperfections. In inspecting steel or iron used in vital parts of rolling stock, when surface imperfections appear, it is a reasonably safe inference that it is not an indication that the balance of the metal is sound and perfect. No railroad man is warranted in assuming any other condition. It is well to bear this in mind notwithstanding the protests and plausible arguments of the salesman. The tires before you represent two cases in point. They were condemned on surface inspection. That it was a proper action, no one seeing the holes shown on these etched surfaces will dispute. A comparison of the rims of these two tires at a point that would be reached at their last turning with the broken tire, shows a very close resemblance.

TIRE FASTENINGS.

In this country the almost universal method of securing driving wheel tires to centres is to depend upon no other fastening than the shrinkage of the tire. At the 20th annual convention of the Master Mechanics' Association, held in 1887, tire gauges with allowances for shrinkage based on about one one-hundredth of an inch to the foot were adopted and are now the recognized standard. It is a question, however, whether with the increased speeds and weight on drivers of recent engine construction a more secure fastening than merely shrinking on the tire should not be used. The practice on many lines is to make from 1⅛ to 1⅝ the limit in thickness for the last turning of driving wheel tire. On some lines with more recently constructed express engines this limit is raised to 2 in. As tires get thin, the blows they are subjected to in service sometimes result in, if we may so call it, an imperceptible hammering out or enlargement which causes the tire to become loose and slip. The initiative has already been taken by some of the eastern lines of securing their driving wheel tire with retaining rings. If the breakage of the tire could be remedied by simply increasing the limit for thickness at last turning, the demand for a new fastening would not be so apparent. The experience on most lines, and which seems to be confirmed in the table and tire sections already presented to you, is that tires are as liable to break when but half worn out as when more nearly reaching the limit at which they are allowed to run.

Let us consider some figures in connection with securing tires with retaining rings. It is expected by some that with retaining rings it is practicable to get ½ in. more wear from a locomotive tire than if shrunk on by the ordinary method. A 3-in. flanged tire for a 62-in. centre will average 1,057 lbs. in weight; at 4¾ cents per lb. (old price) its value would be $50.21. For convenience in calculating, let us assume that it will be condemned at 2 in. Two-thirds of the original weight would be 705 lbs., which, at a scrap value of $19.20 per ton, would be worth $6.77.

Cost of tire	$50.21
Deduct scrap value, at 2 in. thick	6.77
	$43.44

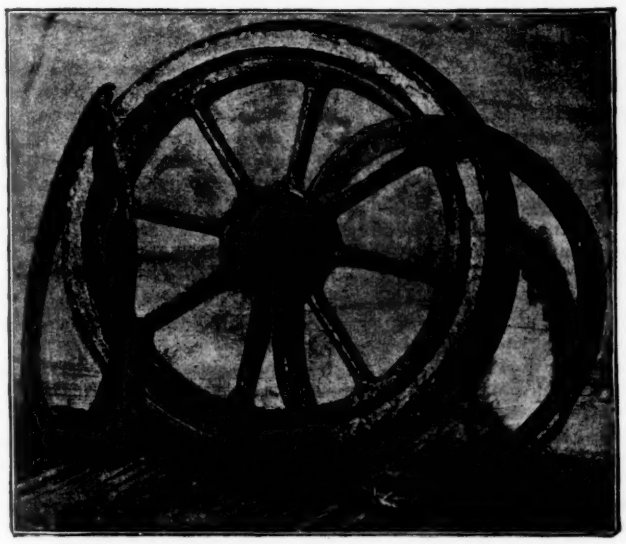
The one inch that would be worn off, therefore, on the above basis, would cost $43.44 or $21.72 per half inch of wear. For any device which will enable railroads to get ½ inch more service out of its tires, they can afford to spend $21.72 per tire, without its costing any more than it may now be doing under the shrinkage plan, besides the advantage of greater security during the whole life of the tire. Assuming that a tire will give 10,000 miles to the sixteenth of wear, ½ in. additional wear would be equivalent to 80,000 additional miles before the tire has to be removed, or at 5,000 miles a month, or 16 additional months' service.

Now let us look at this subject in connection with the smaller truck wheels. It can hardly be allowed, if we omit consideration of the leading engine truck wheels, that a general introduction of steel tired wheels in trucks is called for by the breakage of cast-iron wheels. Especially is this apparent when we compare cast-iron wheel breakage with locomotive tire breakage. The fact is the more general introduction of meritorious devices is often prevented by the prices manufacturers put on their product. Thus the consideration of the use of carefully made steel axles and carefully made iron axles both offered at 2½ cents a pound is an entirely different problem to that of iron axles at 2½ cents a pound and steel at 5 cents. So it is with wheels. A few years ago 42-in. steel tired wheels cost $80 each; at the present time some of the most promising steel tired wheels of the same diameter can be had at a cost of $55 each. Without particularizing as to manufacture the latter figure may be detailed about as follows:

Wheel centre, weight about 415 lbs.	$35 00	each
Steel tire, weight 575 lbs., @ 2¾c	15.81	"
Fastenings, labor fitting, etc.	4.19	"
Total	$55.00	

The smaller-sized wheels are also less in proportion and influenced to some extent of course by the form of fastening. In the above figures we direct your particular attention to the item "labor fitting." The amount—$4.19—is not an estimated one, but is the actual cost of fastening, boring, turning and fitting the tire to 50 centres, all labor included. We will doubtless be criticised for the price at which we have placed locomotive tires in an earlier part of this paper. These figures show that it by no means

*Extracts from a paper by Mr. G. W. Rhodes at the October meeting of the Western Railway Club



Tender Wheel with Retaining Ring Bolts Sheared Off.

follows that $21.72 will have to be paid for a tire fastener. In our opinion, therefore, the real reason why the subject of steel tire truck wheels is getting such general attention is the lower prices at which they have been placed on the market and which has been brought about by the reduction in the cost of tires during the last year. If, then, any large number of steel-tired wheels are to get into service it will be well to consider carefully the principles that should be observed in attaching the tire to the centre.

In Europe this subject has had much more attention than in this country and the variety of methods used at different times, we are almost tempted to assert, is only rivaled by the various forms of automatic couplers devised in this country. An exceedingly interesting sheet illustrative of this, appeared in the *Railway Master Mechanic* in December, 1886. No less than 53 different methods of securing tires to centres are here illustrated. What a fine field for any one to investigate! One of the first problems he will have to battle with will be a decision as to whether a wheel shall be selected composed of many parts or few parts. The real question, however, is the securing of the tire to the wheel, and the way to take up this question is not to weigh the value of the fastenings when the wheels are freshly turned out of the shop with full thickness of tire. Faults rarely develop then, nor when one-half the life of the tire is gone. It should be viewed from the standpoint of having given years of successful service. When thousands of miles have been made, and the tire is reaching its end, it is then that the merit of the fastener will be tested, and if possible it should be so viewed in making a selection.

It has already been asserted that the limit of thickness of tire, in so far as locomotive practice is concerned, secured to centres simply by shrinkage, is gauged not for fear of the tire breaking, but because of its tendency when thin to hammer out and slip. Precisely the same thing occurs with smaller wheels. We have here two bolts removed from a 42-in. wheel, the tire of which was shrunk on the centre and in addition secured by plates and bolts. You will observe close to the heads how the bolts have commenced to shear. You have all seen much worse samples than these, some one-half sheared off and some entirely sheared off—what has produced it? Unquestionably it is the slip of the tire. In the Mansel retaining ring is perhaps one of the best known fasteners coming under this type. It has been used extensively in the old country and is generally well spoken of. In our opinion it is subject to the serious criticisms of bolt shearing. We have but few steel-tired wheels secured with this fastener on the C., B. & Q. R. R., but already the safety of one of our through passenger trains has been jeopardized through the failure of one of these wheels. The accident is, perhaps, best described in the engineer's words: "Was running at a speed of about 48 miles an hour at the time the breakage occurred. It was the left front tender wheel that gave out, it at the time being upon the outside of a tolerably easy curve. All the bolts that pass through the retaining rings and the wheel were sheared off as though done by shears in a shop. The tire came completely off the wheel, going to the inside and falling upon the axle. The forward tender wheel was the only one to leave the track. No damage was done to the tender beyond bending up the brake rigging and twisting off the air pipes. After a delay of one hour and 10 minutes a fresh engine took the the train on to its destination."

The cut shows the wheel in question. At the time the photograph was made the tire had been put on the centre for convenience in shipping; the retaining rings show at either side of the wheel. The sheared bolts were not saved. From the thickness of the tire it will be observed that the wheel was comparatively a new one. Evidently the tire when applied did not have proper shrinkage. The brakes were used a great deal on this tank. Their constant application caused the tire to heat and slip which at once brought a shearing strain on the bolts, eventually cutting them off and resulting in the above accident.

Cases of bolt shearing doubtless occur more or less frequently, but for various reasons seldom come to the surface. The fact that many inventors herald their product as coming under the heading of "boltless wheels" shows clearly that what has been said on this feature of fastenings is well recognized by those who have made the subject a study. If it be granted then that in shrinking on tires of small diameter, as with those of large diameter misfits may be made and also that when worn thin even what was a perfect fit originally is liable to slip through the enlargement of the tire by hammering, or by heating from brake application, it must be apparent that the best form of fastener is one which secures the tire to the centre in a manner that will allow a slip of the tire without any shearing strain being brought on the fastener. In other words, the fastener should be circumferential with the tire and not at right angles to it. Our belief is that this principle should be observed in locomotive driving wheels as well as in the truck or car wheels.

Much more remains to be said on this subject, but as we have already occupied the time usually allotted to the reading of papers we will defer any further remarks until our next meeting, when under the club's new order of business the subject will again come before you for discussion.

Economy of Steam Heating of Passenger Cars.

What follows is an abstract of a paper lately read at Horton, Kan., before a meeting of trainmen of the Rock Island and connecting lines by Mr. J. H. Sewall, General Manager of the Consolidated Car Heating Company:

The subject of steam heating for passenger cars was entertained at an earlier date than is generally supposed, as patents were granted more than 20 years ago to different parties for this purpose. Their devices were tried with more or less success, but the perfection of them had not been enough to elicit favorable approval by the railroad companies until the winter of 1882-83. The benefits of steam heating as compared with fire heating are: Safety in case of wreck, economy of fuel and comfort.

Regarding safety in case of wreck, I need not call your attention to the cases where the car stove has not only destroyed valuable property, but has also burned people alive with as relentless a spirit as did our misguided forefathers burn the so-called witches at Salem. . . . I think you will agree with me that the most striking example of the benefits of steam heat in this respect was on this very railroad, or rather that portion of the Denver & Rio Grande over which this road runs its trains between Colorado Springs and Denver early in November, 1888, when one of the first steam heated trains the Rock Island ever run went into collision with a Denver & Rio Grande train heated by fire. The result, you will remember, was the burning of more or less of the D. & R. G. train, while the Rock Island train was in no way injured by fire.

The economy of fuel is governed by the cost of coal, which differs greatly in different localities. On this division of your road the cost of hard coal, as burned in the stoves and heaters in cars, is about 200 per cent. more than the cost of soft coal that is consumed on the locomotive. The amount of condensation indicates the amount of fuel used. It has been demonstrated by test that a steam heated car will condense about 65 lbs. of water per hour. And if 1 lb. of soft coal will evaporate 5 lbs. of water, it is evident that 13 lbs. of soft coal have been expended per car per hour. Assuming that soft coal costs you here, on the tender, $2 per ton, then the 13 lbs. would cost 1.3 cents for one car for one hour, and for 24 hours 31.2 cents. And as cars equipped with any hot-water device, in which the water is heated by fire, require that fire should be kept in the cars for a day of 24 hours, if cars are in service, in order to prevent freezing, it is no more than fair to make a comparison between fire and steam for a day of 24 hours. We have assumed that the coal burned on the locomotive costs $2 per ton. The hard coal burned in the stoves and heaters costs the Chicago, Rock Island & Pacific, at Colorado Springs, 104 per cent. more, and at Kansas City 211 per cent. more, than soft coal; and as the difference in price is all we want to make the comparison, we will, in this ratio, assume that the coal burned in the cars costs, at Colorado Springs, $4.08 and at Kansas City $6.22 per ton. In order to make a correct estimate of saving at these two points we will take the result of the tests made by the C., B. & Q. as to the amount of hard coal required to heat a car for a day of 24 hours with stoves. This was found to be 200 lbs. of anthracite. At Colorado Springs hard coal costs, we assume, $4.08 per ton, or 40.8 cents for 200 lbs. for one car one day, as against 31.2 cents per car per day when heated by steam. This small saving is attributable to the fact that your hard coal is mined in the vicinity of Colorado Springs, and is remarkably cheap, while the soft coal being mined in the East is much nigher, relatively, in price. But at Kansas City there is a saving of 31 cents per car per day, as hard coal at that point costs, we assume, $6.22 per ton, or 62.2 cents for 200 lbs., as against 31.2 cents for soft coal burned on the locomotive at $2 per ton.

In this relation it may be well to refer to a paper read before the Western Railway Club during the month of March, 1887, by William Forsyth, of the Cincinnati, Burlington & Quincy, an extract from which was published in the *Railroad Gazette* of March 18, 1887:

"The expense which some of the recent accidents have caused the companies in loss of property alone has amounted to $20,000 or $30,000, without paying the damage for loss of life, and the whole sum lost in any one of these accidents would no doubt be sufficient to equip almost any road with a complete system of steam heating by the continuous method, even at the high prices now charged for it. Continuous heating is really an economical system as a matter of economy of fuel. . . . There is very little data to show how much the stoves or heaters require. I have endeavored to get a figure for the continuous system, and I have some figures obtained by our own experiments last year with the different forms of hot water and steam heaters from tests we made on our own road. . . . I found as the result of extended tests that the Searle, Baker and Westinghouse heaters use on an average about 200 lbs. of anthracite coal per car per day; some of them use even more than that. . . . On our Chicago division we have about five trains a day which average 10 cars each, and a number of other trains, which make the equivalent of 15 10-car trains per day. I found the entire amount of anthracite coal used during a winter of 150 days would be 2,250 tons—at $6 a ton would cost $13,500. That is an item, then, for the stoves.

"To get the amount of fuel required by the continuous heating method, I take as an average condensation for cold weather 50 lbs. of water per car per hour."

There is no doubt that Mr. Forsyth's estimate was low, by tests that have been made by the company which I represent. We find that an average of 65 lbs. per car per hour is right. This average is based on an average temperature and an average pressure with one square foot of heating surface to 25 cubic feet of space in the car to be heated. Mr. Forsyth further says: "On a basis of 50 lbs. per car per hour, with our poor Iowa and Illinois coal it will require 10 lbs. of coal burned in the locomotive to heat each car; for a train of 10 cars it would require 100 lbs. of coal. For the 15 10-car trains per day of 150 days, as before, it would give 1,125 tons each at, say, $2 a ton, which would amount to $2,250. Deduct this from the expense of $13,500 arrived at in the cost of the stoves, and we have a saving of $11,250 in fuel in one winter on one division.

"To burn this additional amount of coal 100 lbs. per hour, how much additional heating surface do we require? With our ordinary 18 sq. ft. grate engines we can easily burn 100 lbs. of coal per square foot of grate per hour, and I have known this figure on one road to be as high as 165 lbs., but calculating 100 lbs. per hour per square foot for grate, our additional 100 lbs. of coal would simply require one additional square foot of grate surface, and if we take 50 square feet of heating surface to one square foot of grate, and take a 2-in. tube 11 ft. long as having 6 sq. ft. of heating surface, we would require about 8 additional tubes; so that for heating a 10-car train we would require on a locomotive one additional square foot of grate surface and 50 sq. ft. of heating surface, which latter is represented by eight 2-in. tubes of the ordinary length."

Everything that was ever made does its work better if the proper care is bestowed upon it, and steam heating devices are no exception to the general rule. The points necessary to be observed in order to keep out of trouble are simple, but to obtain the very best results the more brains put into the work the better. Frost must be prevented, and to this end all trainmen must work in harmony. The engineer should carry a uniform pressure in the train pipe, and should not shut off steam without giving the trainman an opportunity to drain the portion of the device under his charge. And to insure the greatest economy in fuel, as well as to reduce the danger of frost, all pipes should be properly insulated that are exposed beneath or between the cars. This should be carefully looked after by the car inspector as well as by those who equip the car, as many dollars may be wasted and much trouble caused by what may seem a small neglect. The trainmen should see that the drip and couplings are warm and working right when stopping at stations, and never allow the temperature in the cars to be above 70 deg.

TECHNICAL.

Bursting of a Fly Wheel.

What might have been a quite serious mishap took place early Sunday morning, Oct. 26, at the works of the Lynn Gas and Electric Light Co., of Lynn, Mass. The fly wheel of one of the larger engines burst and did considerable damage inside and outside the buildings. A fire had started and almost the first result was the sudden releasing of the engine from its load. A runaway was of course a natural consequence, and before the steam could be shut off the wheel went to pieces, portions moving in every tangent direction, through roof, walls, pipes and floors, one portion striking and badly damaging a neighboring building. The total damage figures from ten to fifteen thousand dollars.

Electro-Welded Projectiles.

In a paper read before the Society of Arts, Boston, Mass., Lieut. W. M. Wood described a new method of constructing wrought steel projectiles, and exhibited samples of the new constructions.

The new shell is formed of three mating portions, which, after preparation, are welded together to form the whole. The head or point and the base piece are forged in dies to proper shape and finished, the fuse hole being cut and threaded in the base piece. The central portion is formed of solid drawn steel piping, cut and turned to exact size and length. The three portions are then welded together by the electro-welding process. At each of the welding lines a bur is left projecting outward and inward. The outside bur near the point is either ground off or turned to form a collar enlargement of neat diameter with the bore of the gun, for the support of the forward portion of shell in an exact central position. The bur at the rear end is ground off and the dovetail groove for the soft metal rotating band is cut, leaving the projectile ready for the hardening process and use.

In the construction of shrapnel a longer and more detailed process is necessary. The point and base are of compressed cast steel and the central body is of solid drawn steel tubing. The point is first welded to the tubing, next the flame tube from the fuse to the powder chamber in the base is crimped in at the forward end and the surrounding space within the main tubing filled with bullets or musket balls. Next, the front diaphragm of the powder chamber is crimped to the flame tube and the shell subjected to the second or final welding process. The dovetail groove for the soft metal rotating band is then cut and the welding burs ground off, leaving the shrapnel ready for use.

This process reduces the cost of the shells to an extreme minimum in comparison to that of the molded-steel or armor-piercing shells, and the process having now been successfully applied to the larger makes, can easily be adapted to those of the smaller shells and cartridges.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Elsewhere in this issue will be found the ticket proposed by the Nominating Committee of the American Society of Civil Engineers. Of the ticket, as a whole, little need be said. It is very well chosen, and we take great pleasure in supporting it. The gentlemen named are all well known and will doubtless serve the Society faithfully. The proposed change in the secretaryship, however, deserves special consideration. For some years it has seemed inevitable, notwithstanding the long, and in many ways valuable, services of Mr. Bogart. Mr. Bogart has been Secretary since 1877, and his name and face are known to engineers all over the world. To his activity and energy the Society owes much ; but for several years his other work has necessarily absorbed much of his time, and meanwhile it has become more and more apparent that the welfare of the Society imperatively requires the undivided time of a Secretary who will work for it with devotion and single-mindedness, who will be always at his post, and whose personal care and influence will be felt in all the affairs of the Society. No matter how able a man may be, he must give his personal knowledge and individual attention to a thousand details if he is to fill this vital office thoroughly. He can delegate to others the mere clerical work, but he cannot delegate to any one else the numerous offices that call for wide and minute knowledge of men and their work, and for enthusiasm, judgment and unwearying patience. We do not know that Mr. Trautwine possesses all the qualities of the ideal secretary, but many of them he has in an uncommon degree. His recent years have been largely devoted to the work which his father bequeathed to him. That work has necessitated a wide knowledge of the literature and practice of the profession, so that he is extraordinarily well equipped for the work of the Society's editor and librarian. He is by temperament and training unusually well fitted for the systematic collection and arrangement of knowledge which is an essential part of the successful conduct of the secretary's office. His name is known and honored in all civilized lands, which in itself is no unimportant qualification. And, finally, we believe that he thoroughly appreciates the responsibility of the office and the great obligation which he will assume if he takes up its duties.

The Baltimore & Ohio has just revised its train rules the new code goes into effect Nov. 16. The Standard Code of the Time Convention has been consulted and some of its rules adopted, but the arrangement of the various subjects is different, and the phraseology has been changed in many cases where the substance of a rule has been used. In fact, as we have pointed out many times, these are the most salient objections to most of the independent codes recently adopted. Like the Chicago & Northwestern code, this one has numerous excellent points, and many that do not appear in the standard, but the prime objection to independent work still remains. We have spoken so recently of this that we will refrain from further comment here. But uniformity of plan (which includes correspondence of the numbers of rules) and the closest possible conformity of language (of such rules as are used) are not the only important features in which adherence to the Time Convention standard is desirable. The more we see of codes got up by individual roads, the more clearly does it appear that the whole work of the Time Convention Committee, in plan *and in substance*, is far ahead of anything else that has ever been done in this line in America. With all due appreciation—high appreciation—of the ability of the officers of such roads as the two above mentioned, and recognizing the amount of careful and intelligent work that they have done and caused to be done on independent codes, we must still hold that the compilers of the standard have done a much greater quantity of equally good work. Not that they have shown better ability, but that they have brought perhaps a greater variety of talent and have sharpened one another's wits more effectually, by reason of more practice at that work, and of longer intervals between sessions. Potatoes of various sizes take their proper relative positions in a basket unerringly when the basket is rightly and sufficiently shaken. The great body of train rules resulting from American experience needed a prodigious amount of shaking, and if we judge by the results we are compelled to admit that the Time Convention Committee is the only body that has done enough of this and has rejected enough of the small potatoes. We do do not mean to imply that the small potatoes are to be thrown away ; they should be saved in a separate basket. We should like to call attention specifically to the good points—of which there are a great many—in the B. & O. code, but many of the rules can be justly weighed only after comparing them with what is said, bearing on the same point, in other parts of the same code ; and with a code whose arrangement is not familiar this is a two days' task, for which we cannot spare the time. Furthermore, readers, as well as the editor, would be at a disadvantage ; for, we take it, they desire, not the *Railroad Gazette's* views as to the comparative value of different codes, but a chance to make comparisons for themselves. This they can do with a document which may be readily placed side by side with the Standard Code, for the latter is readily obtainable in all parts of the country ; but where in one book the paragraphs must be read *up*, while in the other they must be read *down*, people will not undertake a comparison.

Life and Cost of Maintenance of the Janney Coupler.

One of the most important subjects now before the mechanical departments of the railroads is the question of the endurance and cost of maintenance of the M. C. B. coupler. It is not only an important subject, but one on which it is difficult to get accurate information drawn from thorough and systematic records and from enough couplers to make the records really valuable. When we examine the records of individual roads we find very conflicting results. The causes of these differences are many. The records may include but few couplers, in which a bad lot of metal may have made up a large percentage of the whole number recorded. Or the few cars equipped may never have run in trains by themselves, but each M. C. B. coupler on a given road may have been used almost entirely in connection with a link-and-pin coupler. Again, the records may or may not include repairs to pin chains and lifting devices ; and they may or may not include repairs to foreign cars. They are pretty certain not to include repairs to the company's cars made off the line. It will be seen that without a uniform method of keeping the records they are necessarily conflicting and may be very misleading. One must be wary about generalizing from any such record that is put before him unless he knows the conditions under which it was made.

As a contribution to this important problem we give on page 765 the latest records of the service of the Janney coupler. This has been given to us somewhat reluctantly by the McConway & Torley company, at our request, and is published now merely as a part of the history of the coupler, and not with the purpose of "booming" it. We believe that the record is a fair one and invite any analysis or criticism of it that is based on facts or reason, and are more than willing to publish any other authentic records that may seem to modify or correct these.

The Janney record covers 124,441 couplers and the same number of knuckles. The average time in service was 12.27 months. The number of roads reported by name in this total is 19, and a great many smaller ones are included in the miscellaneous. The number of couplers on those 19 roads varies from 636 up to 13,945, and they are scattered all over the country.

Our readers probably know, generally, how it is possible for Messrs. McConway & Torley to have so complete a record of breakages. They request all broken couplers and knuckles to be shipped to them with the proper records. They replace *all* couplers which have failed because of defective material, and *one-half* of the knuckles. It is very easy to ascertain if the material of a malleable coupler is defective, but it is not easy to make a good diagnosis of a wrought knuckle. It has been found that about 48 per cent. of the couplers returned have been mechanically defective. It is considered quite fair, therefore, to replace one-half of the knuckles. At any rate the arrangement seems to be entirely satisfactory to the company's customers. This arrangement makes it for the pecuniary interest of the user to return to the makers *all* broken couplers. Considering, therefore, the number of couplers, the period of their service, the territory over which they are spread, and the incentive which the railroads have to make the returns complete, this record is probably the most valuable of any ever published. It ought to represent, more nearly than any other, the actual facts. The tables show (1) broken couplers, (2) broken knuckles, (3) the number in service by roads. Diagrams are given showing the meaning of the classification of breakages. These diagrams are not complete; in the record a diagram is made for each class of failure. Those which we give are, however, characteristic and sufficient to show what the rest must be. From these tables several useful deductions may be made.

The broken knuckles, equated to one year, were 0.0476 per knuckle in service. The broken couplers similarly equated were 0.01916; and the sum of the two is 0.0668. But undoubtedly some of the couples are counted twice in this total, for the reason that there must be cases in which both parts of the same coupler are broken.

The knuckles broken, being 0.0476 for each knuckle, would cost to replace 19 cents per knuckle in service per year; similarly the broken couplers would cost 16 cents, giving 35 cents per year for one coupler and knuckle in service, complete, or 70 cents per car per year. This is the cost of material, from which its scrap value must be deducted. Of course it is not the cost to the railroad companies, as the McConway & Torley company replaces about half the material free. Therefore we may put the cost to the roads now at 35 cents per car, plus the cost of putting in the new material. This does not include the cost of repairs to lifting devices which must be used in some shape with any automatic coupler and may be left out of account in the comparison that any one may wish to make with the cost to him of maintaining other couplers.

It will be noticed that in Table III. there are 45,580 couplers not distributed among their owners, but classed as "miscellaneous." These include some small roads which do not report directly, but many, perhaps most, of their broken parts get back to the makers through the larger roads in consequence of interchange of cars and through the repair shops. Moreover, whenever any one not regularly reporting sends in for knuckles to be used in repairs, the manufacturers write for a detailed report and the return of the broken knuckles. In this way they gather up the scattered data pretty thoroughly. Of course the record now published will still be criticised as not including all breakages. We have stated the reasons why it is probable that such cases are few. It is worth money to the railroads to report all failures, and when they are not reported some officer has failed in his duty and ought to be ashamed to take his salary.

The estimate of the cost of maintenance which we have drawn from the tables does not include knuckles worn out. That item has so far been entirely absent from the returns, except for knuckles in passenger service or on tenders. How important it will be in freight service, if it ever becomes important there, remains a matter of speculation only.

On the other hand, the estimate does include a class of failures that will be greatly lessened in the latest models put into service, and will be done away with when the link-and-pin drawbar is no longer run in the

same trains with the M. C. B. coupler. This class of failures includes much the greater number of lugs off, cracked and chipped, and is caused by short or bent pins running with the knuckle unlocked, and other misuses incident to coupling with a link. These facts were well shown in our issue of June 6, when the new pin designed by the makers of the Janney coupler, and now going into use, was also described. It is found that 75 per cent. of knuckle failures are traceable to pulling strains. This has been determined by careful analysis of about 6,000 cases. Many of these are due to running with the knuckle open and pulling out the end through the pin hole. In Table No. II. it will be seen that 41 per cent. of all the knuckle fractures were due to lugs cracked and chipped. Any one who has observed the facts carefully, and who will look at the diagrams and see just what this classification includes, will see that almost all of that 41 per cent. of broken knuckles will be saved when the link and pin are no longer used; and a considerable part will unquestionably be saved by the use of the steel pin described in the *Railroad Gazette* of June 26. Of course, a still further reduction of failures will be made as the number of knuckles and couplers of improved models increases, and we should expect a great reduction of the cost of maintenance when the figures of 1891 are compared with those of 1890. In passing we may say that the evolution of the Janney coupler as described in the article before referred to, published June 6 last, is an excellent illustration of the intelligent use of statistics. From tables such as we now publish the makers discovered the weak parts of their coupler, and modified the patterns accordingly, thus changing entirely the ratios of breakages of the various parts, and, of course, rapidly reducing the totals.

We are quite aware that the cost of maintenance which we have arrived at here will be criticised as too low. We have lately seen records that show the cost for an M. C. B. coupler, *not* the Janney, however, to be at the rate of $5 per car per year. This was apparently a careful record, too, and included no repairs on foreign cars and took no account of repairs made to the company's cars off the line; so that it was apparently below the actual cost. On the other hand the record was for the first part of the service of the couplers and was probably abnormally high on account of early failure of couplers of bad material. It was also for but 1,000 couplers. The best analysis of cost that we have seen is that made by Mr. Herr, of the Chicago, Burlington & Quincy, published in the *Railroad Gazette*, June 6, 1890. From the first six months' record of 592 cars he found the cost of maintenance 84 cents per car per year, and from the succeeding three months' records he found the cost to be $2.24 per car per year. (The cost to the railroad is but half these figures, as explained above.) It will be seen that Mr. Herr's records and the others cited were for short periods and for a small number of couplers. Mr. Herr's figures also were based on the assumption that repairs of couplers on foreign cars were offset by repairs made to the company's couplers off the line. This assumption may have been quite erroneous, and in any event the number of couplers considered was small and the periods short. Therefore we give much more weight to the figure that we have deduced, viz.: 70 cents per car, from the records of 124,441, couplers after an average service of 12.27 months.

While, as we have said, this figure will be criticised as being too low, the makers of the coupler will probably say that it is too high for the couplers now going into service. Perhaps it is, and if any one can show that our deductions are probably wrong we shall welcome their criticisms, whichever side they are on.

Metal in Car Building.

On another page will be found an illustration of a very good design of iron tender frame, by the Brooks Locomotive Works. About fifteen years ago, when iron tender frames were first advocated, they were taken for trial by a number of roads, but the results were unsatisfactory, principally because the frames were not strong enough to withstand the shocks of minor collisions, and much difficulty was found in straightening them after a blow, which would not have fractured or injured a heavy wooden frame. After those trials the iron tender frame was not looked upon with favor for some years, and it is only within the last two years that it has recovered the lost ground. Now a well designed metal frame, with heavy sills and diagonal bracing, is considered by many competent master mechanics as the best type of under frame for tenders, and we find it the opinion of many representative men that the old wooden frame is no longer satisfactory, and that the metal one is sure to replace it. There is a growing belief that channel or I-beam steel sills will be the favorite type in the immediate future for freight cars.

Apropos of this are the notes of a visit some days since to a freight car repair yard of a large Western road. We noticed there great piles of draft timbers, and longitudinal and end sills taken from freight cars: and while being prepared to believe that a few of these members were taken out because they were fractured, yet we must confess some astonishment at the condition of the timber in these piles. Some of it was still green, not fairly seasoned; all of it was in thoroughly good shape, and hardly a decayed stick could be found. The cause of the removal was very apparent. In some cases the bolts had pulled through the sills, in others the holes had become elongated, many were split, and 99 per cent. of the causes of removal were other than deterioration due to decay. The wood was of that character which would delight the heart of a car-builder. Most of it was thoroughly well seasoned oak. Standing beside these piles with the established value of metal tender frames and the claims of the advocates of metal car sills fresh in mind, we were greatly impressed with the contrast between the condition of these car timbers and what might have been their condition had they been substantially made of rolled steel or iron. When one considers that the actual cost (barring all combinations of manufacturers) of suitable shapes for car sills is less than that of a good quality of timber, and that the security of the attachment of such sills to the drawbar rigging is vastly superior to the security of such fixtures when attached to wooden sills, there seems to be no sufficient reason why iron or steel sills should not be given at least a chance to speak for themselves in freight cars as well as they have in tenders.

In this we are not advocating the use of complicated sills or those of many parts, but we speak of the class of metal work with which all are familiar in bridges, and the same kind of metal shapes as were substituted for the old wooden chords which made up early American bridges. Car sills are comparatively light, and that metal sill which would satisfactorily replace the wooden one weighs less than it, and has nothing like the same number of weak and disadvantageous features.

It may be objected that we have tried iron cars and that steel could hardly be expected to be much better. But we are not making a plea for steel in the place of iron in the forms already tried. What is desired is a better and simpler form of metal car than has yet been brought out; something, in fact, on the same high level of design as the beautiful and simple structures which are daily to be seen carrying locomotives across rivers or forming the skeleton of office buildings in cities. It is not desirable or necessary that the car sides, top or floor, be of metal; such a step is too long, and if taken now would be hasty and result in condemning the whole movement. What is needed is the substitution of steel or iron for those parts that are now giving so much trouble and which by their failure decrease so materially the life of a car that the total cost per mile run during its life in itself proves how backward is the art of car building.

Railroad Rates and Vested Interests.

Some of the newspapers raise the question whether the railroads are likely to conform to the order of the Interstate Commerce Commission by reducing their rates on live hogs to the level on those on hog products. We can hardly believe that there will be any serious contest at this point. It is not the railroads' quarrel It is a contest between Kansas City and Chicago, rather than between the railroad companies and the Commission; nor is it likely that the railroad managers would wish to incur the penalties of disobedience in a matter which can have but comparatively slight effect upon their profits.

From the outset it has been evident that the railroads were not the parties chiefly interested. We quote from the opinion of the Commission:

> After filing their answers the carriers took no further part in the controversy, seeming to feel reluctant to become active in the controversy between those who were their patrons on a large scale, and leaving the matters involved to the judgment of the Commission, but the intervenors were represented by counsel throughout and presented their views as well as the defenses set up by the carriers, both by the evidence as well as in argument.

If the roads did not care to fight while the case was pending, they certainly ought not to do it now.

It is a curious fact that the roads east of Chicago have been engaged for several years, off and on, in a similar controversy, but on the opposite side. The fight east of Chicago has been about beef instead of pork; otherwise the matter at issue has been nearly the same. Here, however, the railroads have given the favor to live cattle, and have been accused of unfair discrimination against the dressed beef industry; while west of Chicago the live hogs are charged higher rates than hog products, even when the latter are carried in refrigerator cars.

The real reason for the difference is found in the circumstances which gave rise to the practice in each case. East of Chicago the railroads and live-stock men are old friends. In the days when railroad managers were wickeder than they now are—and there have been such days, Judge Cooley and Mr. Adams to the contrary notwithstanding—the railroad men used to be interested in the stock yards, as a matter of course, and make stock yard contracts which were very advantageous to the yard and disadvantageous to the railroad owner. Under these circumstances they had the strongest inducement to develop the live-stock traffic. When it was most unprofitable to the railroad it was profitable to the inside ring. Even when there was no actual corruption, the relation between railroads and live-stock men was so close as to give the latter every advantage in urging and receiving favors which were grudged to the shippers of dressed beef.

West of Chicago the matter was reversed. The interest of the roads lay in developing traffic near their western terminus, rather than in favoring Chicago stock yards. Such western traffic development had obvious advantages to the owners of the road. It promoted the settlement of the country. It gave the railroads freight in two directions instead of one; for the packing establishments at Missouri River points required coal and lumber and a variety of other supplies which enabled the roads to load their cars both ways. Under these circumstances it was not only natural but right that the railroads should do what they could to build up a traffic of this kind. Thus we find the roads west of Chicago giving favors to the kind of traffic against which those east of Chicago are accused of discrimination, and carrying these favors to an extent which the conditions by no means seem to warrant. When once a railroad management begins to favor a particular line of traffic, it never knows when to stop. This has been seen over and over again in the oil business, where rates have been arranged, often, perhaps, without any specific purpose of the kind, to favor one set of interest at the expense of others. Each case of the kind proves the necessity for some public authority like the Commission to decide matters from a broader standpoint, or, at any rate, to insist on publicity of the grounds on which the action is based. The fact that railroads east and west of Chicago can be induced by past traditions to take precisely opposite views of the same set of questions proves how hard it is to be sure of getting a broad or candid view of these matters from a body of railroad officials, even when they are influenced by no underhand motives. Between conflicting outside interests, a judicial body can hold the balance far better than a railroad. It is just here that a body like the Interstate Commerce Commission can do most valuable work which the railroads themselves probably could not do.

In saying this, we do not mean to imply that the principles laid down by such a commission will always be correct. In the decision before us it seems to have taken one position which, from the standpoint of public policy, is highly questionable. The Commission says that the question of profit on return freights cannot properly enter into the determination of the proper relative rate for live and dead meats. This seems a mistake. If the conditions of traffic are such that the roads by handling the hog products from Kansas City to Chicago, and the return freights from Chicago to Kansas City, can do the business at less expense than by hauling the live hogs to Chicago direct, it is in the public interest that they should be allowed to do so. If producers and consumers pay the same rates in each case, and the railroads make more money by the former method than by the latter, it indicates that the former method is the more advantageous one from the public as well as the railroad standpoint. The same result is obtained at less cost. This is the primary object to be attained; the first thing is to have the business done in the right way, and if that is secured the question who gets the profit may be left to settle itself.

With the rates that hitherto existed on hogs and hog products respectively, it looks as if the railroad contention were untrue, and as if the profit on the former were unduly great as compared with the latter. In that case the proper course would have been to challenge the railroads' statements of fact, which we believe could have been successfully done. It seems improbable that live hogs, larger in weight and less in value than their products, ought from the standpoint of good railroad policy to pay a higher rate. The order of the Commission that the rates for both classes should be equal seems fair

enough in itself, and not likely to hurt anybody but the Western packers. It is the statement of reasons which is questionable. There is a story told of Lord Mansfield which is not inappropriate in this connection. A friend of his with no special training for the place was going out to fill a judicial position in India. "Do not hesitate," said Mansfield, "to give a good common sense opinion when a difficult legal question is brought before you; you will probably be right. But do not try to give your reasons for your opinion, for they will certainly be wrong."

A collection of annual passes from railroads in all parts of the world is one of the unique things in the library of Mr. Frank M. Baker, of Addison, N. Y., General Superintendent of the Addison & Pennsylvania Railroad. It will hardly do to call this a "collection of autographs," which disguising phrase is so often used to describe a lot of documents of this kind, as the signatures to most of the passes are the worst possible specimens of spider's tracks. Mr. Baker has set out to get one pass from each country in the world, and already shows specimens from Australia, Baden, Barbados, Belgium, Brazil, Cape of Good Hope, Cuba, China, Cochin-China, France, Great Britain, Hungary, India, Japan, Java, Malta, Mexico, Natal, Norway, Peru, Portugal, Russia, Sweden and Venezuela. The most artistic designs are the French. The English specimen is from the London & Northwestern, and is an oval booklet (or book cover) of leather, vest-pocket size, which when opened reveals the pass pasted on the inside. The roads in some of the English colonies and others in the smaller countries imitate this open-book style, but the books are of ordinary shape with square corners. The others are ordinary cards, mostly rather large. One is printed on cloth. It is noticeable that in the majority of the smaller countries the railroads are operated by the government. The Indian passes are good not only for the holder but for "two servants in a third-class car." The Manager of the China Railway Co. sends along a copy of his book of instructions, printed in Chinese. As our Chinese editor is now on his vacation we are unable to say whether this document conforms to the Chinese Time Convention's standard or not. As our readers are aware, from occasional Chinese correspondence printed in these columns, the railroad system of that country is extremely limited. Most of the men sending these passes "take pleasure" in granting these favors (which the recipient can probably never avail himself of) with even more zest than is manifested by traffic officers of roads which have to carry people for nothing in order to fill up their trains. If Mr. Baker were a wicked legislator instead of a railroad officer, we should recommend him as a good party to be "seen" by persons intending to travel in Cochin-China, Venezuela, Malta, etc. He is not likely to find time to use these passes himself.

The whistle nuisance is under discussion by the Philadelphia city government, and we are glad to note that the aldermen recognize that factories are in many instances as flagrant offenders in this line as are the railroads. A strong plea has been made for the adoption of an ordinance which shall apply to whistles and bells on or connected with buildings, as well as to railroad appliances. A representative of the Pennsylvania who appeared before the committee brought up the objection that if the company abated the whistling nuisance it would find itself becoming a violator of the state law. In view of the experience in scores of other cities this seems rather a weak argument. This man's statement that his road restricted whistling as much as possible (while it is still the fact that the runners do much unnecessary whistling) illustrates the difficulty of enforcing a restrictive rule like the one under discussion. It is so hard to get a large number of enginemen to act with good judgment—and with uniform judgment—under a regulation permitting noise under some circumstances but not under others, that it is far preferable (at least far easier) to abolish whistling entirely over as large a territory as possible. In view of the extent to which large and sonorous bells are now used and the increasing employment of watchmen at crossings, railroad officers will do well to consider whether they will not best promote the general welfare, and their own peace of mind, by taking a firm stand in the position that a bell is a sufficient warning in a large class of cases which it was formerly deemed necessary (when many of the existing laws were passed) to protect by whistle. As for signals in switching, the ordinary steam whistle could well be abolished at once with benefit to all concerned. A smaller whistle, or even a mouth whistle, would answer. From the news item we have read we conclude that the Pennsylvania has not brought its practice in this matter to perfection; but so far as we have been able to judge by personal observation it comes nearer to that point than most roads.

Another point in which Philadelphia is active is the grade crossing reform. Public sentiment there is fully abreast of the times, though possibly for the very good reason that the city has some of the worst nuisances of this kind to be found anywhere. But the *Public Ledger* calls attention to the fact that, while there is a constant demand for the abolition of dangerous crossings, the city is permitting the establishment of new ones. The proposed route of extension of the Traction Company's (street) line to Germantown will make grade crossings of the Reading tracks at Twenty-second street and at Hunting Park avenue. The street tracks on Allegheny avenue, authorized by the city, will cross both the Germantown and Norristown branches of the Reading at grade. One of these crossings is particularly dangerous, because a view of or from street cars running westward will be cut off by the high embankment of the Pennsylvania road. The city has also authorized the opening, in the last three years, of seven streets which will cross the Reading's tracks at grade. The *Public Ledger* says, with force: "This is not merely inconsistent conduct, it is a wrong to the city as well as to the railroad. The very purposes of an elevated terminal, intended to secure fast time without danger, will be defeated if the city continues to make grade crossings at the upper end of the line as fast as they are removed from the lower end."

NEW PUBLICATIONS.

Bureau of Statistics of Labor and Industries of New Jersey. Twelfth annual report for the year ending October 31, 1889.

In former years this Bureau has given considerable attention to railroad matters and especially to railroad accidents. So far as we see that class of statistics is entirely omitted in the twelfth report. This is devoted to effect of occupation on health and duration of the trade life of workmen, to real estate mortgage indebtedness and foreclosure execution, to industrial co-operative legislation in England and the United States, and a summary is given of the labor legislation of 1890 in the state of New Jersey.

The Compounding of Locomotives Burning Petroleum Fuel in Russia. By Thomas Urquhart, Locomotive Superintendent, Grazi & Tsaritsin Railway, Russia. Institution of Mechanical Engineers, London.

This is a reprint of a paper presented before the Institution last January, and of the discussion which was had upon it at the meeting at which it was read, with some additional discussion contributed later by Mr. Urquhart. The paper has already been quite freely drawn upon by the mechanical journals, but in its complete form, with numerous drawings and indicator cards, it forms a very valuable document on the subject treated, and will doubtless be widely read by engineers interested in locomotive practice.

The Strains in Framed Structures, with numerous practical applications to Cranes, Bridge, Roof and Suspension Trusses, Braced Arches, Pivot and Draw Spans, Continuous Girders, etc.; also Determination of Dimensions and Designing of Details, Specifications and Contracts, Complete Designs and Working Drawings. By A. Jay DuBois, C. E., Ph. D. Fifth edition, revised and greatly enlarged. New York: John Wiley & Sons, 1890.

The fifth edition of Prof. DuBois' excellent work on the Strains in Framed Structures has been considerably enlarged by the addition of several entirely new chapters. The older portion of the work has also been considerably modified, and the whole appears now in such new form that some extended notice of it may well be given.

The first part of the work is essentially the same as heretofore, and consists of a general discussion of the methods of calculating structures of this kind, with the application of these methods to bridges of various types, together with appendices treating of the effect of concentrated loads, the theory of flexure and the theory of the continuous girder. The sharp distinction which is made between the four different methods of computing structures constitutes a particular excellence of this work, especially for use in a technical school, where the students should, above all things, be first made to appreciate clearly these distinctions, and be taught how to use them intelligently, either singly or in combination. In the practical application to different types of bridges, the use of these principles is clearly explained, and the student who thoroughly masters this book should be well grounded in bridge theory.

At the same time we have noticed in our rather hasty examination of the work some places in which we hoped that additions might be made in this new edition, but in which we have been disappointed. Thus, the general solution of ambiguous cases by the graphic resolution of forces is not clearly indicated; the treatment of the analytical resolution of forces is somewhat unnecessarily cumbered by formulæ which seem to us unnecessary for the understanding of the subject, and which only confuse the student. In the graphical method of moments there is no simple discussion of methods of finding maximum shears and moments for concentrated loads, neither is the general method of finding graphically by moments the stress of any bar in a frame fully discussed; further, in finding the position of a system of concentrated loads giving maximum shear in a panel, the method used is not correct when a load passes into the panel in front of the one considered, as sometimes occurs with short panels. In the discussion of locomotive excess no reference is made to finding it from the maximum panel load; in the discussion of girders with parallel flanges there is no treatment of the truss with treble system of lattice, which is sometimes built, and which often causes some trouble to the student; in discussing the Post bridge the computation of the truss is designated as "simple," and no mention is made of the uncertainties involved in it. There is no discussion of structures with superfluous bars, even in a general way. In the table of strength of materials the cross-breaking strengths given for the different woods are almost all too high, and do not take account of the latest experiments on large beams.

We might specify other points in which we think some amplification would be desirable for the practical engineer. Nevertheless, the book is a bulky one as it is and it would scarcely be advisable to much increase its volume. Still, we cannot but feel that the space occupied with the long discussion of the combined suspension bridge and stiffening truss, and by the theory of flexure, could be better devoted to other things. The exact theory of the stiffening truss would be seldom if ever used, and there are many other subjects which are of far greater importance to the bridge engineer, and which are omitted from the work; and while the details of the theory of flexure are sufficiently discussed in most books on mechanics, and might properly be omitted from a work on bridges. In regard to the stiffening truss, moreover, we hoped to see some statement as to how nearly the ordinary theory agrees with the exact theory.

The chapter on the continuous girder, however, is an admirable general discussion, although the results might have been simplified for a few of the most common cases in practice, and put in better shape for ready use. The subject of the deflection of trusses, however, is treated in a very unsatisfactory manner, and unnecessarily encumbered with logarithms, while no mention is made of the beautiful and simple method first given by Maxwell, and founded on the principle of work.

Part II. is devoted to the determination of dimensions and designing of details, and in it the student will find many useful hints and much valuable information. We have not found, however, in the treatment of the effect of repeated stresses, any mention of the important results lately obtained by Professor Bauschinger, which results have within the past few years led many German bridge engineers to give up entirely the use of any formula taking account of repetition of stress. The subject of compression, and of the formulæ for long columns, is given in considerable detail, and the new straight line formula receives the attention which it deserves. The discussion of details, however, cannot be said to be complete, although it is excellent in many respects. In the discussion of bridge pins, for instance, we should have been glad to see an explanation of the reasons why the assumptions which lie at the base of the ordinary theory are incorrect, and of the reasons why some bridge pins may be shown on the ordinary theory to be sustaining stresses of eighty or one hundred thousand pounds per square inch without signs of yielding. We notice further the statement that the "counter may always be omitted in finding size of pin in any joint in either upper or lower chord," which statement will be found in the case of many bridges to be quite incorrect.

The author rightly says "of course no rivet is ever to be used in direct tension," but he does not explain how the upper rivets in all stringer and floor beam connections, and in many other connections, really are in tension, and what effect this should have upon the details of design. The treatment of flange rivets in plate girders is not exactly correct and would be much simpler by using the ordinary formulæ for longitudinal shear in a beam.

The formulæ for dead weight contain the well-known results obtained by the author, which are probably the most complete formulæ ever deduced, and with the use of proper coefficients ought to give excellent results. We are particularly glad to see a very full chapter on specifications, in which Mr. Cooper's specifications are given entire, together with some instructive running notes and comments.

The chapter on shop drawing, by Mr. Frederick Walcott, is an excellent contribution and should be highly valued by students in technical schools, as well as by all young bridge engineers.

Finally, the chapter on the erection of bridges, by Mr. J. S. Deans, of the Phœnix Bridge Co., is a short chapter of eleven pages, illustrated by eleven large plates, and treating of the different methods of erecting ordinary bridges of various lengths, from short I-beam spans to the 550 ft. span of the Ohio bridge. This chapter will prove of considerable interest to the young bridge engineer, and gives precisely the information necessary for understanding the methods of erecting ordinary truss spans. Some methods of erection which have found application in the case of special structures are not here referred to, such as the erection of arch bridges by means of towers and cantilevers, of cantilevers by building out piece by piece, of continuous girders by rolling out over the supports, erection by hoisting into position, as was done in the case of the Britannia bridge, and some other modes not often adopted.

The book bears evidence of thoughtfu., earnest labor, of painstaking care and of a thorough knowledge of the wants of students. It may unhesitatingly be recommended as one of the best books of its kind, and will well repay careful study.

TRADE CATALOGUES.

Illustrated Catalogue and Price List of Engineering Specialties manufactured by the Curtis Regulator Co., 59 to 63 Beverly street, Boston, Mass.

This pamplet shows the well-known Curtis pressure regulators and steam traps.

Illustrated Catalogue and Price List of Steam Regulating Devices.—Mason Regulating Co., 10 Central street, Boston, Mass.

In this pamphlet are illustrated and described the Mason reducing valve, pump pressure regulator, air-brake pump regulator, steam damper regulator, locomotive reducing valve, and other specialties manufactured by this house.

Catalogue of Signals, Lamps and Lanterns.—The Adams & Westlake Co., 110 Ontario street, Chicago, Ill.; Eastern office, 115 Broadway, New York City.

This is supplementary to the complete illustrated catalogue of this company. It contains lamps and lanterns of various patterns, and in a supplement are given the rules of the Standard Code which pertain to signals and signaling. A great variety of lamps and lanterns adapted to all kinds of railroad use, as well as various train order signals, are also shown.

Sylvan Embellishments of Suburban Stati n Grounds.

Under the above title Mr. M. G. Kern, a landscape gardener of 69 Dearborn street, Chicago, has issued a circular calling the attention of railroad officers to the desirability of supplying "sylvan embellishments" to their suburban station grounds, and discussing some of the main points to be considered in undertaking a work of this kind. The various suggestions indicate that Mr. Kern has a thorough knowledge of his art. He thinks that much good work in tree and shrub planting could be done by section foremen after very little instruction, while at the same time he gives valuable hints in regard to more ambitious plans for the decoration of grounds with flowers, etc.

Emery Wheels; some Suggestions in Regard to their Selection and Use, and a list of those ordinarily the most serviceable on the Grinding Machines made by the Brown & Sharpe Mfg. Co., Providence, R. I.

Under the above title the Brown & Sharpe Co. publishes a valuable little pamphlet, copies of which may be had on application. We give some extracts:

A satisfactory emery wheel is an important factor in the production of good work. Too much, however, must not be expected of one wheel. A variety of shapes, sizes and grades of wheels is necessary to bring out all the possibilities of the grinding machine.

In selecting and using a wheel, we are governed by the character of the metal to be operated upon, the shape and size of the work and the degree of accuracy desired. We have to consider the size of the particles of emery in the wheel, the hardness of the wheel and its width. We also have to determine the speed at which it is to be revolved, the speed at which the work is to travel or be revolved, and whether or not water is to be used. But it should be borne in mind that a wheel should not be selected for a single characteristic, but that each of the essential elements is importantly affected by the others, and that all should be considered in choosing or using a wheel for any desired work.

Within certain limits, and other things being equal, a coarse wheel is less liable to change the temperature of the work and less liable to glaze than a fine wheel. As a rule, the harder the stock the coarser the wheel required to produce a given finish.

A wheel is soft or hard chiefly on account of the amount and character of the material combined in its manufacture with emery or corundum. But other characteristics being equal, a wheel that is composed of fine emery is more compact and harder than one made of coarser emery. The softness of a wheel is generally its most important characteristic. A soft wheel is less apt to cause a change of temperature in the work or to become glazed than a harder one. As a rule, other things being equal, the harder the stock the softer the wheel required to produce a given finish. Generally speaking, a wheel should be softer as the surface in contact with the work is increased.

The width should be in proportion to the amount of material to be removed with each revolution. The quality of the work as a rule is improved by using a wheel of full width if the wheel is soft in proportion.

A wheel is most efficient in grinding just at the point before it ceases to crumble. The faster it is run up to this point the more stock will be removed and the more economically the work will be produced. Occasionally, however, it is necessary to run a wheel rather slowly, as the more slowly it runs the coarser it cuts and the less likely it is to change the temperature of the work. As a general rule, on any given stock the softer the wheel the faster it should be run. Should a wheel heat or glaze, it can often be made somewhat more effective by being run more slowly. On the other hand, if it be too soft, it can often be made to somewhat better hold its size and grind straight by being run more rapidly.

The surface speed of the work should be proportionate to the speed of the wheel; that is, other things being equal, if the speed of the wheel is reduced the speed of the work should be reduced also. The coarser or softer and more free cutting the wheel the greater can be the speed of the wheel and consequently of the work. It is, however, not necessary to graduate the speed of the work as closely as the speed of the wheel.

The desire in accurate grinding is to have a free cutting wheel, and to obtain the proper speeds so that the stock may be removed with the least possible amount of pressure, thus preventing a change of temperature in the work and allowing the high parts to be most speedily reduced.

Thus far we have considered rapidity of production as more important than economy of emery. If, however, we should attempt to use such a wheel to grind a piece of steel 1 in. in diameter and 3 ft. long, it is clear that before the wheel has passed over 2 of the 3 ft. it would have ceased to cut. The problem now is to maintain the diameter of the wheel so as to take a uniform cut over a large area. Each particle of emery must be used as long as possible before being thrown away. A wheel full width and full diameter should be used, and the face should be true, so that as many particles as possible may be brought in contact with the work, and each particle be dulled as little as possible while the wheel is passing over the work. The particles may be used a longer time and are not so rapidly thrown away in a hard as in a soft wheel. Accordingly one expedient in grinding large areas is to use harder wheels as the area of the work increases, the speed of the wheels being reduced as the grade is increased.

The loss of fine particles will not decrease the diameter of the wheel as rapidly as the loss of coarser or larger particles. Thus another expedient is to use a finer wheel. A fine wheel can be relatively softer than a coarser wheel, and so with a fine one there need be less pressure between the wheel and the work, and there is more certainty of obtaining an accurate surface.

As the length or area of the work increases the feed should be coarser, so that the wheel may travel the entire length or area of the piece, while its diameter is practically unchanged.

Water should be used on such classes of work as are injuriously affected by a change in temperature caused by grinding. It should be used upon work revolved upon centres, as in this work a slight change of temperature will cause the wheel to cut on one side of the piece, after it has been ground apparently round.

In very accurate grinding it should be remembered that the exactness of the work will be affected by a change in temperature which is not perceptible to the touch. In very accurate grinding it is also well to use the water over and over again, as by so doing there is less difference between the temperature of the water and that of the work than if fresh water is used. For many purposes soda water is the most satisfactory, as it has less tendency to rust the work or the machine.

Brake Trials in India.

In our issue of April 25 last we called attention to the unsatisfactory manner in which the so-called trials of the vacuum and the Westinghouse brakes were carried on in India, and we urged the authorities to make further investigation before they committed themselves to either system. We pointed out that tests should be made over an extended period, and under the conditions of daily working; that there ought to be no modifications of the trains or of the traffic to suit the peculiarities of either system, and that the full effects of wear and tear, and of the climate, should be allowed to exercise their influence upon the mechanism, without any special attention or nursing on the part of rival manufacturers. Now it appears from a report dated May 6, 1890, and written by Mr. A. W. Rendell, locomotive and carriage superintendent of the Eastern Bengal State Railway, that two trains have been running on that railway for some months, and that they have been the subjects of certain comparative experiments. One of these trains was fitted with the Westinghouse and the other with the automatic vacuum brake. One of the points sought to be determined was the additional amount of coal required to be burned in the locomotive of a train fitted with a continuous brake. This is a point of very considerable interest, and one that must naturally be taken into account when a brake is being selected for a system comprising some 16,000 miles of railway. If it can be shown that a certain brake requires, say, 4 lbs. of coal per mile to work it, this means an addition of some 10 per cent. on the coal bill, which is a very considerable amount. We can readily imagine the officials to whom the selection of a brake for India is confided feeling that the question of coal consumption is one to which they ought to give very earnest attention. In the year 1888-89 the fuel consumption of the railways of India was 1,140,000 tons, and it is evident that a 10 per cent. increase on this would represent a sum that should not be paid without some equivalent being gained.

Unfortunately, the trials were made in a way that deprives them of a good deal of their value. Mr. Rendell points out that they were on too limited a scale to render them absolutely trustworthy. With only one train of each kind the idiosyncrasies of the driver, stoker, or engine may be sufficient to influence the result to a degree that would vitiate the entire test. There were, also, causes, which do not appear in the report, which tend to cast doubt on the figures. The trials of coal consumption on the trains with the brakes out of action were made after the trials with the brakes in action. It was, of course, known at that time which had made the best result, and it was possible for the driver, if he felt any partisan spirit, to do a good deal to modify the figures. The train with the vacuum brake in action used considerably more coal than that with the Westinghouse brake; now when the brakes were out of action it was clearly to the advantage of both parties that the engines should use a good deal of fuel, for then the balance, ascribed to the brakes, would be reduced. We do not suggest that any "jockeying" of this description took place, but it would have been more satisfactory if the trials had been so arranged as to render it impossible. To render comparisons still more difficult, the first trial of the Westinghouse brake was made with an engine smaller than that used for the vacuum brake trial. At the second trial the engines were identical, but in the interval between this second trial and the trial of the trains without brakes in use the engine of the Westinghouse train was fitted with new driving wheels and crank axle, the valves were reset and general repairs executed. Thus a third trial of the Westinghouse brake had to be made with the engine in its improved condition. Both the second and third trials are given in the annexed table, which we reproduce from the report, but the results of the two are averaged in making comparisons.

Mr. Rendell says in his report: "Engine 52 burns 4.8 per cent. less coal per train mile, and evaporates 3 per cent. less water per pound of coal. Therefore engine No. 52 uses about 7.51 per cent. less water than No. 26 under similar circumstances." He then proceeds (see table) to add 4.8 lbs. of coal per train mile to the consumption of the engine fitted with the Westinghouse brake and to deduce the following results:

	Engine No. 52. Westinghouse. Lbs.	Engine No. 26. Vacuum. Lbs.
Coal per train mile	34.87	36.08
" 1,000 ton miles	237.98	259.42
Water per pound of coal	6.45	6.31
" " train mile	205.47	227.73
" " 1,000 ton miles	1,333.83	1,637.38

"These results show a saving of about 10 per cent. in favor of the Westinghouse brake."

It would have been simpler, we think, not to have attempted any correction of the figures, but to have stated that in the case of the Westinghouse brake the use of the brake apparently reduced the coal consumption both in the second and third trials, while the use of the vacuum brake raised the coal consumption from 34.11 lbs. per train mile to 36.08 lbs. over a run of 31,668 miles. We should be inclined to reject the entire trials as being on too narrow a basis to be reliable, were it not that they agree at least in general direction with other experience on the subject. It is well known that the ejector makes considerable demands on the boiler of a locomotive, and that drivers will "run through" the brake and allow it to leak off when they find themselves short of steam. This is one reason why a pump, worked from the crosshead of the engine, is used on some lines, as for instance on the Great Western. It is stated that on the Sind-Pishin lines the drivers cannot afford steam for working the brakes when ascending the heavy inclines. Now it was principally to secure safety on these inclines that an automatic brake was supposed to be wanted in India, and yet the one chosen is said to seriously interfere with the hauling power of the engines.

We must repeat our appeal to the government of India to make further trials before they commit themselves to the very great expense of equipping their entire rolling stock with any form of continuous brake. Their last trial is not more satisfactory than those which preceded it, and the whole subject needs further investigation at their hands. We express no opinion as to the merits of the two brakes, but we urge that if the choice is to be made according to experiments made in India, and the results of years of working in Europe and America are to be ignored, that, at least, the trials should be such as will admit of reliable opinions being formed. If not, they are simply a farce.—*Engineering.*

STATEMENT SHOWING COMPARISON OF RESULTS OF TRIAL OF WESTINGHOUSE AND VACUUM BRAKES.

The results obtained when working the engines without the brakes being equalized and the other trials with the brakes being altered proportionately to obtain a more accurate comparison. Mean average number of vehicles, 13.65; number of trips, 40; total distance, 2,320; total vehicle mileage, 31,668.

Description.	Actuals as per trials.					Revised by adding to the Westinghouse trials the difference in favor of that brake on the efficiency of the two engines when worked under similar circumstances so as to equalize results.				Final comparison of brake trials.	
	Westinghouse.			Vacuum.		Westinghouse.			Vacuum with brake.	Average of second and third trials with Westinghouse.	Vacuum.
	Second trial with brake.	Third trial with brake.	Trial without brake.	Trial with brake.	Trial without brake.	Second trial with brake.	Third trial with brake.				
Driver	Chamberlain	Chamberlain	Chamberlain	Millet	Millet	Chamberlain	Chamberlain		Millet	Chamberlain	Millet
Engine	52 B	52 B	52 B	26 B	26 B	52 B	52 B		26 B	52 B	26 B
Average weight of train in tons (exclusive of engines)	133.32	134.60	133.82	139.25	138.27	133.32	134.60		139.25	133.96	139.25
Total ton mileage hauled (exclusive of engines)	309,311	312,272.00	310,469.45	322,679	320,794.80	309,311	312,272.00		3,226.79	310,791.50	322,679
" coal consumed in pounds	81,581	77,470	84,528	92,894	88,113	81,581	77,470		92,894	79,525.50	92,894
Coal consumed in lighting up engines in pounds	8,960	8,960	8,960	9,184	8,960	8,960	8,960		9,184	8,960	9,184
" " " running trains	72,621	68,510	75,568	83,710	79,153	76,106	71,798		83,710	73,952	83,710
Average coal consumed per mile per vehicle	2.29	2.16	2.38	2.64	2.49	2.41	2.26	4.8 per cent. added.	2.64	2.33	2.64
" " " train-mile	31.30	29.53	32.57	36.08	34.11	32.80	30.94		36.08	31.87	36.08
Consumption of coal per 1,000 ton-miles	231.78	219.39	243 39	259.42	246.74	246.05	229 92		259.42	237.98	259.42
Quantity of water evaporated in pounds	441,340	403,520	459,040	528,350	496,170	476,647	476,738		528,350	473,092	528,350
Weight of water evaporated with 1 lb. of coal	6 08	5.88	6.07	6.31	6.26	6.2	6.64		6.31	6.45	6.31
Average water evaporated in pounds per mile per vehicle	13.93	14.63	14.49	16.68	15.66	15.05	15.05	3 per cent. added.	16.68	15.05	16.68
Average water evaporated in pounds per train-mile	190.23	199.79	197 86	227.73	213.86	205.45	205.49		227.73	205.47	227.73
Evaporation of water per 1,000 ton-miles hauled	1,426.84	1,481.34	1,478.53	1,637.38	1,546.68	1,540.99	1,526.67		1,637.38	1,533.83	1,637.38

TECHNICAL.

Manufacturing and Business.

The Page Belting Co., of Concord, N. H., reports the following among the larger orders recently filled, a 48-in. double belt 127 ft. long for the Thomson-Houston Electric Co., at Memphis; 32-in. belt, 114½ ft. long, for the Mattoon Mfg. Co., Sheboygan, Wis.; complete outfit for the Chicago, St. Paul, Minneapolis & Omaha Railroad; 24-in. belt, 135 ft. long, for Star Thread Co., of Athens, Ga., and a large number of orders for its special Acme link belts.

A large crane has recently arrived at the shops of the Thomson-Houston Co., at Lynn, Mass. It was built by the Morgan Engineering Company, of Alliance, O.

The Scarritt Furniture Co. reports the completion of an order for seats for 19 passenger cars for the Denver & Rio Grande. These are the well-known No. 29 seat with a special arm made for this road.

The Locomotive Anti-sand Equipment Co., of Chicago, has been incorporated for the manufacture and sale of railroad appliances. The capital is $50,000. The incorporators are Arnold J. Schevers, Thomas R. Freeman and Henry S. Reynolds.

The American Construction Co., with a capital of $435,000, has filed articles of incorporation at St. Louis. The stockholders are John E. Risley and A. Zabriski, of New York; J. H. Bethune, St. Louis; A. C. Craney, J. W. Craney and E. F. Donelly, T. E. Morrison and E. B. Thoroughman.

The Fisher Movable Frog & Railway Appliance Co., of Chicago, has been incorporated by J. H. Fisher, W. A. Wilmet and J. H. Callahan.

A 12-spindle multiple drill, made in Manchester, England, was put in the boiler department of Brooks Locomotive Works last week.

The Lake Erie Engineering Works are building a machine shop at Buffalo, N. Y., at a cost of about $300,000. The plan provides for a machine shop built on the gallery plan, 250 × 112 ft., and a foundry 230 × 112 ft., both shops to be ready for business by April 1. In the machine shop two 30-ton traveling cranes will be used, and in the foundry two 30-ton and two 6-ton travelling cranes, all operated by electricity.

The Pullman Co. has just completed the coaches ordered by the Burlington & Missouri River road. Among other novelties these coaches are equipped with the new Scarritt reclining seats with adjustable head rests. They are of the Forney type and upholstered in old gold. The road has also had built some after the same design at the Aurora shops.

Iron and Steel.

It is announced that the $2,000,000 of new stock of the Pennsylvania Steel Co. has all been subscribed for by the stockholders at $150 a share. It is said that the book value of the stock at present, with the new stock counted in, is $213 a share.

Shoenberger, Speer & Co.'s blast furnace near Pittsburgh, which went out of blast in June to be relined and increased in height, will probably resume operations next week. The furnace will have an increased capacity of about 50 tons daily, making an average output of 150 tons per day.

James P. Witherow, of Pittsburgh, has recently placed on the market an improved blowing engine for blast furnaces. Three of these have just been completed at the shops of Mr. Witherow, at New Castle, Pa., and were shipped to the South last week. A number of others are in course of construction.

The order for the sale of the personal property of the Ætna Iron Works, at Ironton, O., provides that the property must be offered Dec. 9, and it cannot be sold for less than $400,000.

Mr. Reese James, until recently Master Mechanic of the Pueblo Iron Works, at Pueblo, Col., has been appointed Master Mechanic at the Edgar Thomson Steel Works.

The McCloud Iron & Steel Co., of Chicago, has been incorporated by S. McCloud, F. G. Holton and W. D. Crosman. The company will manufacture iron and steel articles for railroad use. The capital stock is $100,000.

The furnace now building by the Briar Hill Iron & Steel Co., of Youngstown, O., is expected to produce from 240 to 250 tons per day.

The rolling mill of the Muskegon (Mich.) Iron & Steel Co. started up Oct. 22, and is now being run to its full capacity.

A press dispatch from Pittsburgh says that Carnegie, Phipps & Co. will erect the largest beam mill in the world. The beam mill in operation at the Homestead mills is now rolling 24-in. beams, and larger shapes have been in request. The 36-in. mill will be by several inches the largest of the kind in the world.

The Rail Market.

Steel Rails.—Among the roads reported in the market are the Atchison, for 10,000 tons; the Great Northern, for 60,000, and a Texas road, for 10,000. The quotations are $29 at New York, and $29@$29.50 cash at Pittsburgh. The Allegheny Bessemer Steel Co. is reported to have been sold.

Old Rails.—Sales have been made in New York at $25 for tees and $21 for old steel rails, and in Pittsburgh at $27.50@$28 for old iron rails, and $19@$19.50 for old steel rails.

The Trans-Siberian Railroad.

The British Consul at St. Petersburgh reports that the Russian government does not anticipate any serious engineering difficulties in the construction of the Trans-Siberian railroad to Vladivostock, on the Pacific coast. The only obstacle at present apprehended is purely of a financial nature. As the road would traverse no less a distance than 5,000 English miles, the cost of its construction is reckoned at about 400,000,000 rubles, or about £42,500,000. The financial difficulty in connection with the line is further increased by the consideration that for very many years to come it would not only fail to yield any profit, but would even be incapable of paying its working expenses. In view of this the weightiest political considerations would alone induce the government to decide on commencing the construction of the line simultaneously along its whole length. By building it gradually in sections, and spreading the expenditure over many years the financial difficulty might be overcome. State necessities may, however, demand a more rapid solution of the question. Surveys are at present in progress, but the whole question of its construction remains still under deliberation.

The St. Clair Tunnel.

On account of unfavorable weather great difficulty is experienced in prosecuting the work of opening the approaches. The working forces have been repeatedly stopped by the heavy rains, which have also converted the whole locality into an ocean of mud. The calking of the tunnel was completed last week, a force of workmen was set to take down the brick walls which formed the bulkheads, and the air pressure has been taken off, the last of the bulkhead walls taken out, and the tunnel thus opened from portal to portal. The lining was found to be perfectly tight, no leakage being observable. The bricklayers who are putting in the brick lining of the tunnel began by building in so much of the lining as would be needed for the foundation of the track, leaving the side lining to be put in afterward. The track foundation is now about complete, and a force of workmen is at work putting on the concrete floor and laying the timbers on which the rails are to be supported. When this is finished the tracklaying will begin.

The South Australian Brake Trials.

We understand that the Automatic Vacuum Brake Co., of England, declined to submit a brake for competition in the trials which were to have been made in South Australia this autumn, and that consequently the Westinghouse remains as the only company willing and ready to go into the competition.

More Big Tunnels.

On the 17th inst. the Mayor of Belfast called a special meeting at the City Hall in compliance with a requisition signed by many influential men to consider a project for a tunnel between Ireland and Great Britain. Mr. James Barton, C. E., addressed the meeting, detailing the main features of his scheme. It is to commence at a point on the County Antrim coast and run in a northeasterly direction for 33 miles to Warstow Hill, four miles due east of Portabello. The tunnel is to be kept 150 ft. below the bottom of the sea, which has a maximum depth of 500 ft. The maximum gradient is to be 1 in 75. The cost is estimated at $8,000,000, and the time requisite at "10 or 12 years." The scheme is endorsed by Prof. Hull, of the Geological Survey, and others. Resolutions were adopted urging government support and a committee was appointed.

Sir C. J. Reed, sometime Chief Naval Constructor of the British Goverment, has proposed a tubular railroad across the English Channel in lieu of the Channel tunnel or the Channel bridge. The plans are being urged forward with a view of applying for the necessary Parliamentary powers as soon as possible. The projectors of the tunnel scheme will, it is said, give this scheme 'a negative support." In noticing it *Herapath's Journal* says: "It is obvious to any one that, as a tube above the bed of the sea could be destroyed from a man-of-war, the military objection applies less strongly to it than to Sir E. Watkin's enterprise. It is purely a military question. If any scheme can be devised free from the possibility of danger it will command success; but if any possible element of risk be present the national voice would for a certainty regret it."

THE SCRAP HEAP.

Notes.

The blacksmith shops of the Atchison, Topeka & Santa Fe., at Fort Madison, Ia., were burned last week. Loss $20 000.

The Northern Pacific wheat elevator at Eureka Junction, near Walla Walla, Wash., was burned last week. Loss, $100,000; fully insured.

The wages of the section foremen west of the Missouri River on the Chicago, Rock Island & Pacific have been raised from $45 to $47.50 per month.

Large numbers of laborers from this country are being employed on the Atlantic & Pacific in place of Mojave Indians. The Mexican laborers are given contracts for three months, and returned home free of charge if dissatisfied.—*Mexican paper.*

A Chicago dispatch states that Messrs. Armour, Morris, Swift and other large pork packers have purchased 3,630 acres of land in Lake County, Ind., 25 miles from Chicago, for the purpose of establishing stock yards and packing houses at that point.

On the morning of Oct. 28, about 1 o'clock, a passenger who was alone in the smoking car of a train on the Cleveland & Pittsburgh, when near Hudson, O., was robbed by armed thieves, just after the train had started from a small water station. The passenger reported this to the police at Pittsburgh, and says that the conductor refused to believe the story and ejected him from the train for non-payment of fare.

A Louisville (Ky.) dispatch states that the Old Colony has paid in that city the following amounts to victims of the Quincy derailment: Lucy Johnson, a colored nurse, slightly injured, was paid $9,000. Judge Edwards asked for only $3,000 and was given it, although badly hurt. Mr. Oscar Fenley, who lost wife, mother, children, sister and niece, will be paid a large sum, and so will his brother-in-law, W. B. Abbott. Their claims will be settled probably this week. The claims of the Louisville people will aggregate $80,000.

Pacific Mail Steamships.

The Pacific Mail Steamship Co. is building two new vessels of 2,000 tons each to be paid for out of the earnings of the company. The vessels are to accommodate the trade along the north coasts of Central America and South America, connecting three times a month at Colon with the company's steamers from New York. This business has heretofore been done entirely by foreign vessels.

Public Opinion and Brakes.

We hear that the rumor that the G. I. P. Railway has ordered some more sets of the vacuum brake has excited the greatest alarm and indignation in the minds of the public of the Konkan, and that the Punchayet of Pogglegaon are resolved to send a deputation to the Secretary of State to prevent the use of a brake which, they are informed, will suck up all water within 10 miles of the line and reduce their now genial climate to an Arctic one.—*Indian Engineering.*

Fast Atlantic Service.

The Dominion government is now considering the three tenders received for the fast ocean mail steamship service to be placed on the Atlantic route between England, France and Canada. The Compagnie Generale Transatlantique, between Havre and New York, has submitted a tender to the Canadian government to run weekly mail steamers between Havre and Quebec, stopping either at Plymouth or Southampton. The tender offers to put on weekly steamers of 18 knots from and after May 1, 1893, the time stipulated by the government in its call for tenders. If the tender is accepted they will run fortnightly steamers for a year from May, 1892. They have two steamers of 12,000 H. P. each now under construction. Halifax will be made the winter port. It is stated that a deposit of $100,000 has been made with the Canadian government as a guarantee of good faith. Mr. A. D. Boyce Douglas, M. P., Managing Director of the Naval Construction & Armament Co. (Ltd.), of Barrow-in-Furness, the concern whose offer to construct a fleet of fast Atlantic steamers is now before the Canadian government for consideration, had a lengthly interview with members of the cabinet at Ottawa last week. The construction company, of which Mr. Douglas is Managing Director, has 11 large vessels in course of construction.

The Production of Steel.

Superintendent Porter has issued a census bulletin giving our production of steel for the census year ending with June 30, in tons of 2,000 lbs., for which we take the following table, to which we have added the percentage of increase:

Kinds of steel. (Ingots or direct castings.)	Tons of 2,000 lbs. Year ending May 31, 1880.	Year ending June 30, 1890.	Percentage of increase.
Bessemer steel	983,208	3,788,572	285.63
Open-hearth steel	84,302	504,351	498.27
Crucible steel	76,201	85,536	14.88
Clapp-Griffith's steel	.....	83,963	.....
Robert-Bessemer steel	.....	4,504	.....
Total	1,145,711	4,466,926	290.76

The amounts produced at the two periods were, in gross tons, 1,022,956 and 3,988,327.

In 1880 there were 73 steel works in 14 different states, Pennsylvania leading with 35 works and producing 57.04 per cent. of the total, Illinois, Ohio and New York following in the order named. This year 19 states have 158 steel works, Pennsylvania again leading with 79 works and 61.97 per cent. of the production, Illinois, Ohio, West Virginia and New York following in the order named, Massachusetts preceding instead of following New Jersey, as in 1880. Colorado follows New Jersey with a production of 16,029 gross tons.

California, Colorado, Illinois, Ohio and Pennsylvania are the only states returned as making the 1,818,172 gross tons of steel rails produced; of this Pennsylvania produces slightly over 67 per cent. and Illinois over 30 per cent. The increase in the production of steel rails has been 174.7 per cent., over 75 per cent. of our steel having gone into rails in 1880, while in 1890 the percentage of ingots made into rails was only 53.

Premiums for Railroad Inventions.

The "Verein deutscher Eisenbahn-Verwaltungen" has offered nine premiums, of a total value of $7,500, for inventions and improvements relating to (1) the construction and mechanical arrangement of railroads; (2) rolling stock and its maintenance; (3) the administration and working of railroads and railroad statistics, as well as important works on railroads. Without restricting the scope of the competition, and without binding the jury in its decisions, it is recommended that competitors should confine themselves to the following subjects: (1) Design and construction of a locomotive boiler which, without increasing its weight, affords safety against explosion, and reduces, at the same time, working expenses; (2) improvements in the construction of locomotives, especially the valve motion, whereby a better utilization of the steam may be obtained; (3) proposal and justification of a simpler means of calculating truck hire; (4) the construction of a durable and practicable coupling for steam pipes or continuous brakes, without the use of India rubber; (5) the construction of a practical and cheap switch brake. The competition is limited to inventions and improvements covering the period of eight years, extending from July 16, 1883, to July 15, 1891, and works and drawings must be sent in between Jan. 1 and July 15, 1891, to the "Verein deutscher Eisenbahn-Verwaltungen," Berlin, from which also complete copies of the regulations governing the competition may be obtained.

The Forth Bridge.

The Marquis of Tweeddale, speaking at the North British meeting, said the Forth Bridge is already earning almost enough to pay the full dividend on its cost, and that no fear need be entertained that the North British or any of the guaranteeing companies will be called upon to make up any deficiency under the guarantee. As an instance of the development of traffic since the opening of the bridge, he mentioned that the traffic between Edinburgh and Dumfermline and Kirkcaldy had increased 88 per cent. He excused the shortsightedness of the board in not anticipating the congestion at the Waverley Station by saying that no one could reasonably expect that the traffic via the bridge would increase so rapidly; and again that the company were wise in waiting to see what traffic they would have to provide for before committing themselves to such a great capital expenditure.

Parliamentary Expenses.

The *Railway Official Gazette* makes the following summary of the parliamentary expenses of the companies engaged in the late railroad squabble in Scotland:

Caledonian	£21,168
North British	17,408
Glasgow & Southwestern	4,894
Great North of Scotland	2,904
Total	£46,374

Some regret is expressed that nearly all of this sum has gone into the pockets of clever English barristers, and it is urged that the scene of future fights of that kind be transferred to Edinburgh. Mr. Boulton, the chairman of the Caledonian, stated that the expenditure of that company was equal to a loss of ¼ per cent. on the ordinary stock of the company.

Coal Going to England.

The Norfolk & Western Railroad has made the first shipment of bituminous coal ever made from the United States to England on an order from the British Admiralty, for experimental use of the coal on the government cruisers. The "Teutonic," which crossed the Atlantic last week, is said to have used Pocahontas coal for the first time.

Salt Lake City.

A late issue of the Salt Lake City *Tribune* says that there are in operation in that city 42 miles of electric railroad and seven miles of road operated by steam motors. Eight miles more of electric road are building. There is great activity in building, and the real estate transfers in the first nine months of this year were 38 per cent. more than in the whole of 1889.

Tubular Cars in England.

The *Iron and Steel Trades Journal* mentions a report that Col. North, of nitrate of soda fame, is negotiating for the purchase of the Vulcan Steel Works at Barrow, intending to acquire them for the Tubular Wagon Co., Limited, in which he is interested. The *Journal* adds

"that if a deal is effected the works will be employed in the production of American freight cars, with a carrying capacity of 30 tons. The cars are said to be very light and strong." Efforts have been made for a long time to introduce these cars into use on English railroads, but the general prejudice against American rolling stock has so far proved so strong as to prevent their adoption by any road but one, we believe. Colonel North is reported to have vast wealth and has the prestige of success, and he may be able, particularly with the added advantage of a factory in England, to overcome the conservatism of the English railroad managers.

Decorating an Engine Driver.

Adrien Poncet, the dean of engine-drivers in France has had the Cross of the Legion of Honor awarded to him by M. Carnot for long and meritorious service. In 1832 this veteran drove the first locomotive made in France over the line from Saint Etienne to Roanne, and also conducted the first engine on the railroad from Paris to Saint Germain. Poncet, who is 75 years of age, had 48 years of engine-driving.

LOCOMOTIVE BUILDING.

The Chicago, Burlington & Quincy is not yet in the the market for new engines as reported last week, but the question of a large order for locomotives is under consideration. We understand that it is not yet decided whether or not such an order will be immediately placed.

The Baldwin Locomotive Works have received an order from the Baltimore & Ohio for three eight-wheel express passenger locomotives with 78-in. drivers.

The Pittsburgh Locomotive Works have received an order for 13 ten-wheel engines for the Cincinnati, New Orleans & Texas Pacific.

The Rogers Locomotive Works have received an order for 20 engines from the Nashville, Chattanooga & St. Louis.

The government of New South Wales has placed with the Baldwin Locomotive Works an order for 12 ten-wheel passenger locomotives, somewhat similar to the engines of the same type built for the Baltimore & Ohio and now running very successfully on that road. The limited weight (on account of the bridges) makes it necessary to reduce the dimensions somewhat, while the specification of materials is altered to conform to the practice of the New South Wales Government. Thus, the fire boxes will be of copper, tubes of brass, staybolts of copper and possibly the wheel centres will be of wrought iron. The specifications are not yet fully determined. The engines will have screw reversing gear. The service for which they are intended is to haul passenger trains weighing 144 gross tons (2,240 lbs.) at a speed of 22 miles per hour up a grade of 176 ft. per mile, or trains weighing 176 gross tons at the same speed up grades of 130 ft. per mile, there being curves of 528 ft. radius on the 130 ft. grades. In all important respects the engines will conform to American practice. These engines are to be built with the utmost despatch and shipped direct to Sydney by steamer.

CAR BUILDING.

The Cincinnati, New Orleans & Texas Pacific has received from the Elliott Car Works of Gadsden, Ala., 200 fruit cars, capacity 40,000 lbs.; also from the United States Rolling Stock Company, Anniston, Ala., 100 furniture cars, capacity 60,000 lbs. These cars are equipped with automatic couplers and air brakes.

The order for the 5,300 Philadelphia & Reading cars referred to last week has not yet been given out.

The Lehigh Valley is said to be asking bids on about 1,000 cars.

The Weatherford, Mineral Wells & Northwestern has ordered 50 box cars from the Anniston works of the United States Rolling Stock Co.

The Chicago & West Michigan is building 10 cabooses at its Muskegon shops, each having six berths.

The United States Rolling Stock Co.'s works at Decatur, Ala., has about completed the orders for 200 fruit cars for the Georgia Southern & Florida, and 60 platform and 10 stock cars for the New Orleans & Northwestern road.

The Chicago, Rock Island & Pacific is having a number of the Montgomery stock cars built for service on its lines.

The Winona & Southwestern has just received its first passenger equipment, four cars, 52½ ft. long, and containing 60 seats. The exteriors are finished in olive green and the interiors in antique oak. At one end of the car is a lavatory finished in marble, while at the other end is a small smoking room. The seats are of the Forney pattern, as now made by the Scarritt Furniture Co., of St. Louis.

John Wister, Spencer C. Gilbert, G. M. McCauley Geo. K. Reed and W. W. Card, the committee appointed at the meeting of the creditors of the Harrisburg Car Co., in Harrisburg, Oct. 15, have prepared a report of their investigation of the company's affairs. The committee does not consider it advisable to grant the extension of liabilities asked for, but recommends that the Commonwealth Guarantee Trust & Safe Deposit Co. of Harrisburg be appointed Receiver. The directors of the company have accepted this proposition, and have taken steps, in conjunction with the committee, to have the appointment made.

Thirty narrow gauge freight cars, which were recently constructed by the Crossen Car Co., of Cobourg, Ont., for the government road to Hall's Bay, will be shipped on the steamship "Greetlands," which sails in about a week for St. John's, Newfoundland.

BRIDGE BUILDING.

Baltimore, Md.—The contract for the bridge at Monroe street at the railroad crossing has been awarded at the Mayor's office to the Youngstown Bridge Co., of Ohio, at $27,000. The firm is required to complete the bridge by next May. It is to be an iron bridge of three spans, with three iron supports on granite bases, erected from the ground. There will also be abutments at each end on granite piers.

Bryan, Tex.—C. F. Bryan and others propose to build a bridge at this point to cost about $20,000. A large part of this sum it is expected to raise by the sale of bonds.

Chattanooga, Tenn.—The Chattanooga Railway, Bridge & Terminal Co. has been organized with C. E. James, President, and J. T. McChesney, Secretary, to build the railroad bridge over the Tennessee River. It is to be a single track bridge with double approaches, and cost $500,000. The Chattanooga Land, Coal, Iron & Railroad Co. and the Chattanooga Western Railroad are both interested in the structure.

Cincinnati, O.—On the Cincinnati, Hamilton & Indianapolis road the stone abutments for a bridge over Richland Creek were completed last week, and the erection of an iron bridge, 170 ft. in length, has been commenced. The work of putting in the stone abutments for a new bridge over Sears Creek has been commenced.

Derby, Conn.—The Commissioners of New Haven and Fairfield Counties, at a recent meeting, decided to make the new iron bridge over the Housatonic River, at Derby, 38 ft. wide, with a 24-ft. roadway and two 7 ft. foot-walks. The contract will be given out immediately and it is said that the Berlin Iron Bridge Co. will do the work.

Elizabeth, Pa.—The Committee on the Banta Bridge, at Roselle, has recommended that the present structure be replaced by a new iron beam bridge, and the Supervisors have adopted that plan.

Houston, Tex.—The following 16 proposals for the construction of a 100-ft. iron truss bridge, with trestle approaches, across Buffalo Bayou, on Sabine street, to connect the Fourth Ward, north and south, were opened by the Common Council, Oct. 27: George S. Govier, of Dallas, for the King Bridge Co., $9,170; Chicago Bridge & Iron Co., $10,800; Smith Bridge Co., Toledo, O., $6 per lineal foot, $6,600; and approaches, per lineal foot, $5; Wrought Iron Bridge Co., Canton, O.; $10,190; Groton Bridge & Mfg. Co., Groton, N. Y., $9,375, $9,697, $10,650, $11,050, $10,440 and $10,800; Milwaukee Bridge & Iron Works, $9,978; The Berlin Iron Bridge Co., East Berlin, Conn., $12,800; Columbus Bridge Co., Columbus, O., four bids, $9,352.21, $9,014.46, $8,086.80, $8,348.25. Lane Bridge & Construction Co., Newark, O., $10,500, $9,000. Variety Iron Works, Cleveland, O., $6,715, and $6,473. Pittsburgh Bridge Co., Pittsburgh, Pa., Plan A, $7,458; Plan B, $10,219; Plan A, 5 ft. cylinder, $8,125; Plan B, 5 ft. cylinder, $9,554. King Iron Bridge & Mfg. Co., Cleveland, O., Plan A, $8,380; Plan B, $8,680. Wisconsin Bridge & Iron Co., Minnesota, Wis., Plan A, $6,076; Plan B, $6,566. Southwestern agent of the Penn Bridge Co., Dallas, Tex., $11,000; sidewalk additional, $500. Trenton Bridge & Iron Co., Trenton, Ia., $8,050. Lane Bridge & Iron Works, Chicago, $10,808. The bids were referred to the Board of Public Works.

Joliet, Ill.—Proposals are wanted until Nov. 10 for the erection of an iron bridge at Joliet by Charles C. Wilcox, City Clerk.

Marble Falls, Tex.—Proposals are wanted until Nov. 18 for the construction of an iron bridge over the Colorado River, by Louis G. Hester, Civil Engineer.

Maspeth, N. Y.—It is probable that a bridge will be erected by the Supervisors over Newtown Creek, at Maspeth, at a cost of $25,000.

Perma, Mont.—The Northern Pacific has awarded the contract for the construction of two steel bridges, one at Perma and one at Clark's Ford. The contract for the stone work has been let to the Montana Granite Co., of Helena.

Radford, Va.—The American Bridge & Iron Co., of Roanoke, has, it is stated, received the contract for building a bridge over New River.

Saco, Me.—The contract was closed with the Berlin Iron Bridge Co., East Berlin, Conn., for a wrought iron deck truss bridge, length 50 ft., roadway 68 ft., for the sum of $3,750.

San Antonio, Tex.—It is reported that a contract has been let at $13,000 for the construction of an iron bridge at Convent street.

Sheboygan, Wis.—Proposals are wanted for furnishing specifications for a swing iron bridge, by C.V. Boley, City Engineer.

Willimantic, Me.—A new iron bridge will probably be erected at this place by the town authorities.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Iowa the Supreme Court decides that a railroad which has acquired from a city the right to perpetual possession of certain land, and is in the actual occupancy thereof, is liable for the taxes thereon, though it does not own the title to the fee.[1]

A Massachusetts statute authorizes a railroad to take so much land in a certain region "as it may deem necessary or suitable for station purposes, and for tracks and yard room to be used in connection therewith." Another section provides that the company, in the exercise of the powers granted, is to be subject to all the duties, liabilities and restrictions which are provided by the general laws in like cases, and another statute provides that "land without the limits of the route, fixed as aforesaid, and taken or purchased for depot or station purposes shall not be exempt from taxation." The Supreme Judicial Court rules that land taken for station purposes, is liable to taxation, though the limits of the road have not been fixed as provided; that the whole of the taking is for station purposes, as the tracks and yard room are merely incidental, and that though part of the taking was once within the limits, yet if it has been sold, and the whole of the taking is for station purposes, that part will not be exempt.[2]

In Minnesota the Supreme Court rules that a condemnation by a railroad corporation of the upland abutting upon the water embraces also the incidental riparian right of improvement and occupany of the submerged lands, although no specific mention is made of riparian rights.[3]

In Michigan it is held by the Supreme Court that where the owner of land conveys a right of way across it to a railroad company, with the right to construct aqueducts and drains, the company is not obliged, at common law, and irrespective of contract, to construct bridges for the use of the owner across ditches it has made in the construction of its road.[4]

In Kentucky the plaintiff and other creditors of an insolvent railroad company authorized their agents to purchase the road, and afterward to transfer it to a new corporation, to complete the road and operate it, for the purpose of securing their debts. Subsequently this corporation was consolidated with another, and plaintiff sued to recover the value of its interest in the property, as having been converted without its consent. The Court of Appeals holds that plaintiff was only entitled to recover its proportionate share of the stock of the corporation to which the road, with plaintiff's consent, was transferred after its purchase.[5]

In the Federal Court it is laid down that where the receiver of a railroad company makes an arrangement for the transportation of the freight and passengers of another railroad company over the line of his road, and there is no provision making the arrangement obligatory on either party for any stated period of time, the receiver may terminate such arrangement at will, without previous notice to the other company.[6]

In Ohio, the Supreme Court rules that where a railroad incorporated in Ohio misuses a franchise conferred upon it, or claims the right to exercise, or has exercised, "a franchise, privilege, or right in contravention of law," the Supreme Court has jurisdiction to inquire into and correct the mischief, though the corporation may be engaged in interstate commerce, and the misuser or usurpation to be corrected relates to and concerns that traffic.[7]

Carriage of Goods and Injuries to Property.

The Supreme Court of Missouri rules that the General Railroad Law making provision for the appropriation of lands "by any road, railroad or telegraph corporation, created under the laws of this state," gives to a railroad company created by special charter a mode of procedure to condemn land in addition to that given by its charter, and it may resort either to the provisions of its special charter or to those of the general laws.[8]

In Indiana the Supreme Court decides that when a city grants a right to a railroad company to use a street, an abutting land-owner cannot recover damages from the city, but only from the railroad.[9]

The Supreme Court of Minnesota rules that it is *prima facie* contributory negligence for one to voluntarily allow a valuable horse to run at large in the public streets, contrary to law, in the immediate vicinity of unfenced railroad tracks.[10]

In Iowa the Supreme Court holds that the fact that horses broke out of the field in which they were confined, and strayed upon the track, does not make plaintiff guilty of contributory negligence, where the fence inclosing the field was reasonably sufficient to keep them in, though the herd-law was in operation in that county, prohibiting stock from running at large.[11]

In Mississippi the Supreme Court holds that one who purchases land subsequent to the building of the railroad, and with a full knowledge of the construction of the roadbed and trestles, may recover damages for the overflow of the land caused by obstructions erected by the company, though the company has done nothing to contribute to the injury since the acquisition of title by plaintiff, as the injury is a continuing one.[12]

In Iowa the Supreme Court rules that where there is no evidence that a demand was ever made on a railroad company occupying a street to level the bed of its road and the tops of the rails, it will be presumed, from long acquiescence, that the track was laid as was intended, and an abutting lot owner cannot recover damages for such alleged defect.[13]

The Supreme Court of Texas holds that as the Texas statutes require a railroad company to first pay the compensation before appropriating land, one upon whose land a railroad company has entered without condemnation does not lose his lien or title by recovering judgment in a suit for damages, and may recover compensation from the purchaser of the rights of the first.[14]

In Minnesota the Supreme Court rules that failure to fence the track, at a point some distance from the depot, is not excused by proof merely that some freight was received and discharged at the place in question.[15]

Injuries to Passengers, Employes and Strangers.

In Mississippi it is held by the Supreme Court that a railroad company is not liable for an injury to its brakeman caused by a want of sufficient sand in the sand-box on the engine, if the insufficiency be due to the failure of that servant whose duty it is to fill the sand-boxes suitably before the trains start, to perform his duty properly, when it does not appear that the company was negligent in his selection and retention, as he is a fellow-servant of the brakeman.[16]

The Federal Court rules that an employé of a railroad company who is being transported by the company from one place of employment to another cannot recover for injuries received while sitting on a brake-wheel between the cars.[17]

In Kansas the Supreme Court holds that in an action for injuries to an employé of a railroad company, sustained by falling from a car while climbing a ladder on the side, evidence of the practice and usage of others in climbing the ladder of a box-car is not admissible to prove due care on the part of an injured employé.[18]

In a case in the Supreme Court of the United States the plaintiff was employed with others under the direction of a foreman in loading rails on a construction train which had left a station at a time when one of defendant's regular trains was overdue there, as the foreman knew, and which was standing on the main track about two miles from such station; the length and weight of the rails was such that concert of action was necessary to lift and throw them on the car safely, and to that end the foreman gave the word of command for such actions until but three or four of the rails remained, and the regular train was seen fast approaching; plaintiff and others were waiting for the command to lift and throw on the car the rail they were holding, when the foreman, with violent language, ordered them to get it on the best way they could, and in the excitement one end of the rail was thrown with more force than the other, so that the rail struck the side of the car, fell back, and, before plaintiff could get out of the way crushed his leg and foot. The court holds the company not liable.[19]

In Pennsylvania the Supreme Court rules that a railroad laborer cannot recover from the railroad company for injuries received through the negligence of the foreman of the gang in which he is working, the foreman being his fellow-servant.[20]

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[1] City of Muscatine v. Chicago, R. I. & P. Ry. Co., 44 N. W. Rep. 909.
[2] Norwich & W. R. Co. v. County Com'rs, 23 N. E. Rep. 721.
[3] Hanford v. St. Paul & D. R. Co., 44 N. W. Rep. 1144.
[4] Stewart v. W. & M. Ry. Co., 44 N. W. Rep. 1116.
[5] Deposit Bank v. Barrett, 13 S. W. Rep. 337.
[6] Investment Co. of Philadelphia v. Ohio & N. W. Ry. Co., 41 Fed. Rep. 378.
[7] State v. Cincinnati, W. & B. Ry. Co., 23 N. E. Rep. 928.
[8] Corey v. Chicago, B. & K. C. Ry. Co., 13 S. W. Rep. 346.
[9] Burkham v. O. & M. Ry. Co., 23 N. E. Rep. 799.
[10] Moser v. St. Paul & D. R. Co., 44 N. W. Rep. 530.
[11] Story v. C. M. & St. P. Ry. Co., 44 N. W. Rep. 690.
[12] Mississippi & T. R. Co. v. Archibald, 7 South Rep. 212.
[13] Merchants' Union Barb Wire Co. v. C. R. I. & P. R. Co., 44 N. W. Rep. 900.
[14] Rio Grande & E. P. Ry. Co. v. Ortiz, 12 S. W. Rep. 1,129.
[15] Moser v. St. Paul & D. R. Co., 44 N. W. Rep 530.
[16] Louisville, N. O. & T. Ry. Co. v. Petty, 7 South Rep. 351.
[17] Martin v. B. & O. R. R. Co., 41 Fed. Rep. 125.
[18] South Kansas R. Co. v. Robbins, 23 Pac. Rep. 113.
[19] Coyne v. U. P. R. Co., 10 S. C. Rep. 382.
[20] Kinney v. Corbin, 19 Atl. Rep. 141.

The Supreme Court of Michigan holds that a railroad which is guilty of negligently kil ing an employé is not relieved from liability because of the contributory negligence of one of the deceased's fellow-servants.[21]

In the Federal Court it is decided that a bridge watchman on a railroad and the engineer and conductor of a train on the road, being engaged in different departments of the company's service, and working under the immediate direction of different foremen, are not fellow-servants, so as to exempt the company from liability to the former for the trainmen's negligence.[22]

[21] Hunn v. Mich. Cent. R. Co., 44 N. W. Rep. 502.
[22] Pike v. C. & A. R. Co., 41 Fed. Rep. 95.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Pennsylvania, semi-annual, 2½ per cent. in cash, payable Nov. 29.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Baltimore & Ohio, annual, Baltimore, Md., Nov. 17.
Boston & Maine, annual, Boston, Mass., Dec. 6.
Boston, Revere Beach & Lynn, annual, Boston, Mass., Nov. 20.
Boston, Winthrop & Shore, annual, Boston, Mass., Nov. 20.
Buffalo, Rochester & Pittsburgh, annual, 36 Wall street, New York City, Nov. 17.
East Tennessee, Virginia & Georgia, annual, Knoxville, Tenn., Nov. 19, and special, Knoxville, Tenn., Dec. 6.
Fort Worth & Denver City, annual, Fort Worth, Tex., Dec. 9.
Georgia Pacific, annual, Birmingham, Ala., Nov. 26.
Manhattan (Elevated), annual, 71 Broadway, New York City, Nov. 12.
Marietta & North Georgia, special, Marietta, Ga., Nov. 25.
Milwaukee & Northern, special, Milwaukee, Wis., Nov. 12.
New York, Lake Erie & Western, annual, 21 Cortlandt street, New York City, Nov. 25.
New York & Northern, annual, 32 Nassau street, New York City, Nov. 12.
Richmond & West Point Terminal, annual, Richmond, Va., Dec. 9.
Wabash, special, St. Louis, Mo., Nov. 25.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Southern & Southwestern Railway Club* will hold its next meeting at Nashville, Tenn., Nov. 20.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, in the Gilsey House, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday, of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p.m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the Southwest* holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p. m., on the third Saturday in each month.

The Civil Engineers' Association of Kansas holds regular meetings on the first Wednesday in each month at Wichita, Kan.

American Society of Civil Engineers.

The Nominating Committee has made the following ticket:

President, Octave Chanute; *Vice Presidents*, John Bogart, Charles Hermany; *Secretary*, John C. Trautwine, Jr.; *Treasurer*, George S. Greene, Jr.; *Directors*, Theodore Cooper, Clemens Herschel, Edward P. North, residents, and Rudolph Hering and S. Whinery, non-residents. Of the ten nominees, five have been in the Board of Direction before, but only two are at present members of the Board.

Engineers' Club of Philadelphia.

A regular meeting was held June 21, Vice-President Wilfred Lewis in the chair; 30 members and one visitor present.

The following were elected: Active Members, Messrs. E. Jones Acker, George T. Barnsley, C. J. Bechdolt, Thomas Reath Brown, Geo A. Bullock, Easton Devonshire, A. L. Eltonhead, Frank G. Fahnestock, W. L. Ferguson, Herbert M. Fuller, David Leavitt Hough, George R. Ide, Jerome T. Kelly, R. H. Lee, Jr., Alan N. Lukens, H. S. Meily, Teile Henry Müller, Elias W. Oviatt, S. B. Peck, James Reed, S. R. Stubbs, T. Kennard Thomson and William Vollmer; Associate Members, Charles G. Hilbreth and Robt. J. Parvin.

The Secretary presented a letter from Mr. E. L. Corthell, Active Member of the Club, inclosing a copy of an address made by him before the Western Society of Engineers, in regard to participating in erecting a monument to the late James B. Eads; the said monument to be erected in St. Louis at an estimated cost of from $15,000 to $18,000. The letter concludes with the request that all those who desire to join the Monument Association should send their names through the Secretary to Col. E. D. Meier, C. E. Bank of Commerce Building, St. Louis.

The Secretary presented for Mr. Robert A. Cummings an illustrated description of the subject of Granolithic Pavements, in which Mr. Cummings describes this form of pavement, giving European practice with regard thereto, etc., together with a table of tests of cement and granite dusts.

A business meeting was held Oct. 4, President H. W. Spangler in the chair; 31 members and one visitor present.

The Secretary presented a correspondence with regard to the participation by the Club in the proposed International Congress of Engineers to be held during the coming World's Fair at Chicago, and moved that a committee of three to consist of the President, and two other members to be named by him, should be appointed to take up this subject so far as this Club is concerned. It was so ordered.

The meeting then adjourned as the lower rooms of the Club House were occupied by members of the British Iron and Steel Institute, the Verein Deutscher Eisenhüttenleute and the American Institute of Mining Engineers, who were making their headquarters at the Club House during their visit to Philadelphia.

A regular meeting was held Oct. 18, President H. W. Spangler in the chair; 21 members and one visitor present.

At the last meeting it was ordered that a Committee be appointed to consist of the President of the Club and two members whom he might select to consider the question of the participation by the Club in the proposed International Congress of Engineers at the time of the coming World's Fair in Chicago. The President presented a report stating that he had appointed Messrs. Wilfred Lewis and E. V. d'Invilliers as the other members of this Committee, and setting forth what had been done by the Committee.

On motion of the Secretary, the sense of the meeting was expressed to the effect that it is desirable for the Board to consider the said report, in full, and report to the Club at the next business meeting.

The Secretary presented, for Mr. Robert A. Cummings, a photograph and description illustrating the effect of gases from locomotive stacks upon vegetation.

Mr. Arthur Falkenau presented an extensively illustrated description of a new method of making barrels by machinery. The drawings illustrating this description are of so elaborate a character that it would be impossible to give a comprehensive abstract.

New England Railroad Club.

The regular meeting of the club will be held at the United States Hotel, Boston, Nov. 12, at 7:30 p. m. The subject for discussion is "The Economy and Safety of Swing-Motion Trucks as Compared with Rigid Trucks."

Northwest Railroad Club.

The subjects for discussion at the next meeting of the club, which will be held in the St. Paul Union Depot on Saturday evening, Nov. 8, are: (1) "Rigid versus Swing Beam Trucks;" (2) "Best Form of Locomotive Side Rods."

Order of Railway Conductors.

This Association held its twenty-third annual convention at Chattanooga last week. The next annual convention will be held at Hartford, Conn. The election of officers for the ensuing year resulted as follows: President, W. O. Bickley, Wabash; First Vice-President, F. M. Mitchell, Memphis & Charleston; Second Vice-President, L. G. Baldwin, New York & New England; Secretary and Treasurer, Harry P. Feltrow. The Executive Committee was not changed.

Western Society of Engineers.

The next meeting of the Western Society of Engineers will be held Wednesday evening, Nov. 5, at eight o'clock. In the absence of a professional paper Mr. L. P. Morehouse will read a paper entitled "The State and the Railroads." The Secretary will also present a report of the convention held at the society's rooms on Oct. 14 and 15 on "An International Engineering Congress" for 1893.

PERSONAL.

—Mr. H. C. Whiteridge, formerly Auditor of the Rock Island & Peoria, died in Rock Island, Ill., on the night of Nov. 1, of heart disease.

— Mr. N. A. Somers, Master of Transportation of the Wheeling & Lake Erie Railroad, with headquarters at Newark, O., has resigned on account of ill health.

—Mr. George W. Wollaston, formerly connected with the *Railroad Gazette*, has been recently appointed Agent of Pedrick & Ayer, of Philadelphia. Mr. Wollaston has a very extensive acquaintance among railroad officers, and is one of the best liked of the railroad supply men.

—Mr. Meade Stillwell, Division Superintenent of the Missouri Pacific, who was recently appointed to a similar position on the Columbus, Hocking Valley & Toledo, was presented with a handsome diamond pin by the conductors, at Sedalia, Mo., and also a gold-headed cane by the engineers, before he left for his new post.

—Mr. John Atkinson, a veteran painter in the car shops of the Michigan Central at Detroit, died in that city last week at the age of 85. Mr. Atkinson was born in Hull, England, and came to Detroit before the day of railroads. For many years he kept a paint store in that city, but had been in the railroad shops the last part of his life up to 1886, when he became too old and feeble to work. His skill at his trade was exceptional, and many specimens of his work are still to be seen in the passenger cars of the Michigan Central. He was at one time foreman painter.

ELECTIONS AND APPOINTMENTS.

Atlantic & Pacific.—The office of H. W. Gardiner, as Secretary and Treasurer of this company, now in the Mills Building, No. 15 Broad street, New York, have been removed to No. 95 Milk street, Boston. F. E. Hancock having resigned the office of Auditor, the separate office of Auditor (in the East) has been discontinued and the duties merged with those of the General Auditor, J. W. Reinhart.

Baltimore & Ohio Southwestern.—J. E. Rose having resigned the position of Superintendent, that office has been abolished. C. H. Howard has been appointed Trainmaster of the company, with headquarters at Chillicothe, O.

Cape Fear & Yadkin Valley.—R. Percy Gray has been appointed Assistant to the President, with office at Greensboro, N. C.

Central Massachusetts.—The directors elected at the annual meeting held at Boston, Mass., Oct. 29, are as follows: Samuel N. Aldrich, Marlboro; Thomas H. Perkins, Henry Woods, William T. Parker, Moses W. Richardson, Boston; Elisha S. Converse, Malden; Charles E. Sweet, Charles P. Darling, Newton; William M. Gaylord, Northampton, and J. Edwin Smith, Worcester.

Charleston, Sumpter & Northern.—Chas. E. Kimball has been elected President, vice Jno. S. Silver; A. A. Howlett has been elected Vice-President, vice John Harlin; A. L. Merriam has been elected Treasurer, vice A. A. Howlett.

Charleston, Wilmington & Norfolk.—The officers are: John C. McNaughton, Philadelphia, President; R. Duncan Harris, of New York, Vice-President and Treasurer; Carroll Forster, of Philadelphia, Secretary, and the following directors: Ex-Gov. Thomas J. Jarvis and Hon. Thomas Pinckney, of South Carolina; C. W. Kennedy, of Philadelphia; R. Duncan Harris, of New York; Hon. J. L. Delano, Ohio; Gen. Z. A. Huguenin, Charleston; Hon. A. S. Cadwallader, Yardley, Pa.; Lewis C. Maus, J. C. McNaughton, Lewis A. Conwell, Wm. A. Hazard, Carroll Foster, M. J. Ramsey, Philadelphia; Hon. A. J. Hodder, New York, and James McKenna, Philadelphia.

Chicago & Eastern Illinois.—William Hill has resigned the position of General Passenger Agent to engage in other business. His successor is Charles L. Stone, formerly his assistant. F. V. Davis has been re-appointed Freight Traffic Manager and L. R. Brockenbrough succeeds him as General Freight Agent of the company, with headquarters at Chicago.

Allen Cooke, General Master Mechanic, having resigned, C. J. Clifford has been appointed Acting General Master Mechanic, with office at Danville, Ill.

Chicago & Erie.—John Roach has been appointed Roadmaster, with headquarters at Huntington, Ind.

Chicago, Milwaukee & St. Paul.—James M. Barr, late Superintendent of the Nebraska division of the Union Pacific, has accepted the position of Division Superintendent of the division of this company between Chicago, Ill., and Marion, Ia.

E. W. McKenna has been appointed Assistant Superintendent at Milwaukee, Wis.; H. R. Williams, Assistant General Superintendent, Minneapolis, Minn.; D. A. Olin, Assistant General Superintendent, Chicago.

C. H. Place has been appointed Car Accountant, with office at Milwaukee, Wis., vice J. F. Cochrane, resigned.

Chicago, St. Paul & Kansas City.—W. R. Busenbark, formerly General Passenger and Traffic Agent of this company, with headquarters in the Phenix Building, Chicago, has been appointed Traffic Manager, with headquarters in the same building. He has been succeeded by F. H. Lord.

Cincinnati & Springfield.—At the annual meeting of stockholders at Cincinnati, O., Oct. 29, the following directors were elected: Jos. Ramsey, Jr., W. M. Greene, N. R. Johnson, John C. Davie, E. F. Osborn and T. H. Lovett, of Cincinnati, James Barnett and G. S. Russell, of Cleveland, and J. T. Dye, of Indianapolis. The new board met and elected Joseph Ramsey, Jr., as President, J. C. Davie, Secretary, and G. S. Russell, Treasurer.

Cleveland, Cincinnati, Chicago & St. Louis.—The company makes the following announcement: Having leased the Cincinnati, Sandusky & Cleveland and the Columbus, Springfield & Cincinnati road, the company has taken charge of the property of those companies and will operate the lines as a part of its system. Officers will be: Transportation and Maintenance of Way, W. M. Greene, General Manager, Cincinnati; Motive Power, J. A. Barnard, Assistant General Manager, Indianapolis, Ind.; Traffic, Freight and Passenger, O. G. Murray, Traffic Manager, Cincinnati; Auditing Department, P. A. Hewitt, Auditor, Cleveland, O.; Treasury Department, G. S. Russell, Cleveland. Possession of the property is taken as of Oct. 1, 1890.

Cleveland, Wooster & Muskingum Valley.—Among the incorporators of this road, which was recently chartered in Ohio, are: H. E. Keim, E. J. Estep, M. R. Dickey, W. F. Carr and F. H. Goff, of Cleveland, O.

Columbus, Hocking Valley & Toledo.—Meade Stilwell, formerly Superintendent of the Sedalia & Kansas City division of the Missouri Pacific, with headquarters at Sedalia, Mo., has been appointed Superintendent of the Hocking and River divisions of this road, vice C. D. Norris, resigned.

Columbus Southern.—W. D. Brown has been appointed General Freight and Passenger Agent of this company, with office at Columbus, Ga., vice C. H. Smith, resigned to accept other service.

Columbus & Western.—J. E. Clemence has accepted a position as Master Mechanic of the company's shops at Columbus, Ga.

Delaware, Lackawanna & Western.—William S. Sloan, General Freight Agent and son of President Samuel

Sloan, was elected Third Vice-President, in charge of the freight and passenger departments, at the annual meeting of the Board of Directors, held in New York on Oct. 31.

Erie & Huron.—W. N. Warburton is now the General Freight and Passenger Agent of this company, with office at Chatham, Ont.

Fitchburgh.—E. K. Turner having resigned the office of Chief Engineer of this road, A. S. Cheever has been appointed to succeed him with charge of maintenance of way and structures, with the exception of passenger stations, freight sheds and houses, and tenements, which will be under the supervision of J. W. Marden, Superintendent of the car department.

Louisville & Nashville.—Charles A. Kritzky, Secretary to the General Manager of the road, has been appointed Assistant General Manager.

Magnolia & Southern.—The following are the officers of this company recently incorporated in Arkansas: T. J. Elmore, President; R. S. Owen, Vice-President; C. M. Boring, Treasurer; F. W. Todd, Secretary, and E. Elmore, General Manager, all of Magnolia, Ark.; H. P. Smead, General Attorney, of Camden, Ark.

Mississippi Valley.—F. Mitchell has been appointed General Freight Agent of the Northern Division of the road, R. F. Reynolds, General Freight Agent of the Southern Division, and C. H. Seterlock, Assistant General Freight Agent of both divisions.

Missouri Pacific.—The following changes and appointments have recently occurred: J. C. Forester, Commercial Agent at Atchison, Kan., has been transferred to Kansas City, Mo., to succeed A. W. Street, promoted; J. O. Phillippi, as Assistant General Freight Agent, with office at Omaha. B. G. Sargent, appointed Commercial Freight Agent at Memphis, Tenn., vice J. A. Woodson, resigned; Frank Reardon, Superintendent of locomotive and car departments, with office in St. Louis. He will report direct to the General Manager.

Mohawk Valley & Northern.—The incorporators are: Robert O. Alexander, Warren R. Harper, A. G. Mills New York; Alexander R. Harper, Philadelphia; A. B. Steele, Albert Wilber, Warner Miller, Herkimer, N. Y.; C. F. Phillips, Brooklyn; Thomas E. Merritt, Middleville; Wm. U. Roberts, Cobleskill; De Witt C. Le Fevre, Buffalo, and Henry Patten, Albany.

New Orleans & Northeastern.—At a meeting of the stockholders of the company in New Orleans, Nov. 5, the following directors were elected: Henry Abraham, Jules Aldige, Frank S. Bond, D. Graff, C. C. Harvey, Harry H. Hall, John P. Richardson, R. M. Walmsley and Charles Schiff. The board made Mr. Schiff President, C. C. Harvey Vice-President, John Glynn. Jr., Secretary, and H. H. Taum, Treasurer.

New York Central & Hudson River.—Clinton L. Rossiter has been appointed Superintendent of the Harlem Division, with office at White Plains, N. Y., in place of George H. Worcester, resigned.

New York, Lake Erie & Western.—J. H. Parsons, Superintendent of the Susquehanna division, has resigned to accept a position on the Atchison, Topeka & Santa Fé.

Ohio & Northwestern.—E. F. Gray has been appointed General Freight Agent of this road, with headquarters in Cincinnati, vice C. H. Goodrich, resigned to accept service elsewhere.

Oregon Improvement Co.—P. F. Bush has been appointed Chief Engineer and Superintendent of the construction department of the company, with headquarters at Seattle, Wash., to succeed F. A. Hill, who recently resigned.

Pecos Valley.—W. H. Vaughn has been appointed Superintendent of Transportation for the road, with headquarters at Eddy, New Mexico.

Peninsula Railway & Navigation Co.—The officers and directors of the company, recently elected at Tacoma, are as follows: President. James Wickersham; Vice-President, C. A. Snowden; Secretary, Charles B. Stackpole; Treasurer, R. J. Davis. Charles E. Hale, P. A. Paulson, C. A. Snowden, John N. Eberhart, Scott A. White, John T. Redman and James Wickersham.

St. Louis, Iron Mountain & Southern.—E. T. Horn has been appointed Superintendent of the Central Division, with office at Little Rock, Ark.

St. Louis & San Francisco.—T. W. Lillie having resigned the offices of Secretary and Treasurer of this company, H. W. Gardiner has been appointed Acting Secretary and Acting Treasurer, with address at No. 95 Milk street, Boston. The offices of the Vice-President and of the Secretary and Treasurer, now at No. 15 Broad street, New York, have been changed to No. 95 Milk street, Boston.

San Diego, Phœnix & Galveston.—The directors and incorporators of this California company are: W. H. Corlton, Thomas Higgins and F. H. Dixon, of the San Diego & Eastern Terminal road; ex-Mayor M. D. Hamilton, John Castle, Chairman of the Chamber of Commerce, and Col. A. A. Bean, late Division Superintendent of the South Pacific at El Paso, Tex.

Savannah, Americus & Montgomery.—The office of Carroll H. Smith, recently appointed General Eastern Agent, has been established at 739 Broadway, New York City. Mr. Smith was formerly General Freight and Passenger Agent of the Columbus Southern.

Savannah, Florida & Western.—W. B. McKee having been appointed Assistant to the General Manager, the office of Comptroller was abolished on Nov. 1. The offices of Auditor of Expenses and of Auditor of Earnings were consolidated Nov. 1, and H. H. McKee appointed Auditor. The office of General Accountant has been established as a bureau of the General Manager's office, and C. T. Morel has been appointed General Accountant, all with offices at Savannah, Ga.

Shelbyville, Nashville & Northern.—The incorporators of this Tennessee road are G. C. Sandusky, Thomas R. Myers, A. A. McCorkle and T. Ford, of Shelbyville.

Union Pacific.—The following appointments have been made: B. Campbell, Assistant General Traffic Manager; D. G. Woodward, General Freight Agent; F. S. Miller, Assistant General Freight Agent, with offices in Portland, Or. R. D. Fowler has been appointed Acting Assistant Superintendent of the Wyoming Division, with headquarters at Green River, Wyo., in place of Mr. G. Hilliard, resigned.

Wabash.—F. R. E. Woodward has been appointed Assistant Claim Agent, with headquarters at Springfield, vice J. B. McCracken, resigned. He will have charge of the settlement of stock and fire claims on the Wabash lines from Chicago to Bement, Bement to Hannibal, Decatur to East St. Louis, Bluffs to Quincy, Clayton to Keokuk, and on the Pittsfield, Streater and Edwardsville branches.

Western New York & Pennsylvania.—Clarence R. Nehr, Division Engineer, has removed his headquarters from Orleans to Rochester, N. Y.

C. T. Dabney has been appointed Superintendent of the Buffalo Division of this road, in place of H. Dwyer, resigned. His office will be at Buffalo, N. Y.

RAILROAD CONSTRUCTION.
Incorporations, Surveys, Etc.

Atlanta & Dahlonega.—Application will be made to the next Georgia legislature for a charter for this road to extend through De Kalb, Fulton, Milton, Forsyth, Cobb, Hall, Dawson and Lumpkin counties, to the state line in Rabun County.

Bristol, Elizabethton & North Carolina.—The grading of the road has been completed from Bristol, Tenn., to Elizabethton. A construction train will begin laying track from Bristol by Dec. 1. Cars are expected to be running from that point to Elizabethton before the end of the year.

Canadian Pacific.—On the Mission Branch, which extends from a point called Mission, B. C. (43 miles from Vancouver), south to the boundary line, a distance of 10 miles, the grading is about four-fifths done, and the contractor, D. McGillivray, of Vancouver, has about 100 men now at work. The track is laid only to the bridge across the Fraser River, which consists of eight spans of 150 ft. and one draw span with 100 ft. opening. This bridge is a Howe truss bridge on pile and cribwork piers. The character of the work is easy, being mainly through the delta lands of the Fraser River. The maximum grade is 150 ft. per mile, and maximum curve is five degrees. This road is to connect with the Seattle, Lake Shore & Eastern, and with that line makes an all rail connection with Seattle and all Puget Sound points.

Castle Valley.—The articles of incorporation of this company will be filed in Utah in a short time by W. Driggs and others, of Salt Lake City, who are now organizing the company. It will be about 40 miles long.

Charleston, Cincinnati & Chicago.—A firm of Philadelphia bankers, Barker Bros., is said to have arranged for the payment of the company's indebtedness and for funds to complete the road to Minneapolis, Va. Twenty-three miles of road from Johnson City, Tenn., south are in operation and 12 miles northward have been completed. Much of the grading between Johnson City and Marion has been completed ready for track laying.

Charleston, Wilmington & Norfolk.—At a recent meeting of the stockholders the purchase of the right of way of the Mt. Pleasant, Santee & Little River, and Portsmouth & South Mills companies, and all their other property, was authorized. The control of these charters gives the road a charter for its entire line from Norfolk to Charleston, S. C., 365 miles. John C. McNaughton, of Philadelphia, is President. The capital stock is $6,000,000, of which $500,000 is reported subscribed. The Carolina Land Co. and the Carolina Construction Co. have been organized by the stockholders of the railroad.

Columbia & Kootenay.—The grading of this road is about three-fourths completed, the track is laid for more than half the distance, and the road will be completed by Dec. 31. The contractor for the unfinished portion of the road is Hugh Keefer, of Vancouver, B. C., and there are about 500 men now at work on the road. Fifteen miles of track has been laid since Jan. 1. The road extends from the junction of the Kootenay and Columbia Rivers, about 160 miles below Revelstoke, B. C., following the Kootenay River through the Selkirk range to the Kootenay Lake, a distance of 28 miles. The character of the work is difficult, the road following the Cañon of the Kootenay, which is mainly through rock. The maximum grade is 150 ft. per mile, and the maximum curve is 10 degrees. There are no iron bridges on the road, the most important bridge being a wooden one across the Kootenay River of three spans of 150 ft. each and one span of 180 ft. The bonds of the company are guaranteed by the Canadian Pacific and the road is leased to that company.

Corpus Christi & South America.—Griffin Bros., of Minneapolis, have been given the contract for the completion of the road from Corpus Christi to Brownsville, Tex., a distance of 150 miles.

Gadsden & Attalla Union.—About seven miles of this road has been graded, and work is in progress on the balance. The track has been laid for 5½ miles. The road is being built from Gadsden to Alabama City, Attalla, Black Creek Falls and Belle View Highlands, Ala. M. L. Foster is Superintendent, and Robert C. Venable, of Gadsden, Ala., is Chief Engineer.

Great Northern.—The line from Grafton to Cavalier, N. Dak., 32 miles, has just been completed. The track laying was commenced about a month and a half ago. The contractor was P. Brennan. The line was graded about this time last year.

Kansas City, Watkins & Gulf.—The grading has been finished to a point 21 miles south of Alexandria, Ga., and the track is being laid north from Lake Charles. Arrangements have been about completed to finish the tracklaying on 100 miles of the road from the present end of track, near the Southern Pacific, to Alexandria. This division it is expected to have in operation by May, 1891.

Lancaster & Hamden.—Eight miles of track has been laid on this Ohio road since Jan. 1 and the grading has been finished on 30 miles, the bridges erected, and cross-ties distributed. The line is being built from Wellston to Lancaster and Columbus, O., and to a point on the Ohio River opposite Point Pleasant, W. Va. James H. Kyner, of Omaha, and J. H. Morris, of Grand Island, Neb., are the contractors for grading and tracklaying. The grades are one per cent. and the curves three per cent. There is one tunnel. The road is being built by E. P. Buell & Co., of Circleville, O. Samuel Effinger is Chief Engineer.

Little Wabash.—The surveys are still in progress between Carmi and Effingham, Ill., but it is expected that they will be completed in a few weeks, and the contracts for grading will then be awarded by Dec. 1, or soon after that date. E. M. Rice, of Effingham, is Chief Engineer.

Louisiana, Arkansas & Missouri.—The first five miles of track from Tripple, Ark., south, has been completed. The road will extend from Brinkley, Ark., via Delhi to Alexandria, La., through the cotton districts in Southeastern Arkansas and Northern Louisiana, now without railroad facilities. The work is to be continued steadily, and the first section will be in operation in a few weeks.

Magnolia & Southern.—The preliminary survey has been made for this road from Magnolia, Ark., south to the Louisiana State line, about 25 miles. The grading will not be commenced before next February or March. The grades will not exceed 50 or 60 ft. per mile.

Mary Lee Coal & Railway Co.—It is rumored that the Louisville & Nashville will soon acquire the railroad of this company extending from Boyles to Lewisburg, Ala., about 10 miles, and that it will be extended to Thomas Furnace, passing the Hecla and Vulcan mines.

Mexican Pacific.—About 500 men are working on the southern division of this road between Tonala and Tuxtla Guiterez, Mexico, and about 33 miles has been graded. The track has been laid on about 20 miles of the distance. The company is doing the greater part of the work and has a number of small contractors employed. The work on this line will be light, comparatively speaking, except in the mountains, where there will necessarily be some heavy rock work. The maximum grade is four per cent., equated on all curves. The maximum curve is 12 degrees. The prospects for the completion of the road are considered to be very good. The company received a subsidy of $8,000 a kilometre from the federal government of Mexico, and many valuable concessions from the states through which it passes. The road is being built by a syndicate organized in England. An iron pier 900 ft. long has been erected at Tonala Chiapas, on the Pacific coast, and large quantities of rails from England are being delivered at that point by vessels. The road is designed to cross Mexico, with one terminal on the Pacific at Tonala, State of Chiapas, and the other on the Gulf of Mexico at Frontera, State of Tobasco. The distance is about 400 miles. The work of construction is proceeding slowly but steadily on the southern division. It is not decided when the contracts for the northern division between Tuxtla and Frontera will be let. There will be few iron bridges at first as most of the streams can be bridged by wooden trestles, but by the terms of the concession from the general government all waterways must be crossed by stone or iron bridges within two years after the acceptance of the road by the government inspectors. George Wilson is the General Manager. His address is City of Mexico or Tokenham Buildings, London, Eng. Samuel Killebrew is Chief Engineer and H. C. Yeatman is Assistant Engineer of the northern division; address San Cristobal de las Casas, Chiapas, Mex.; and J. C. Oliphant is Chief Engineer of the southern division; address Tonala, Chiapas, Mexico.

Minneapolis, St. Paul & Sault Ste. Marie.—Grading from the present terminus of the line in Dickey County, Minn., to the junction with the Aberdeen, Bismarck & Northwestern is being pushed at the rate of a mile a day. A large force of men is also employed on the Aberdeen, Bismarck & Northwestern grade, which has been unused for two years, preparing it for the track layers. The work is being prosecuted from both ends and at such intermediate points as are accessible. The bridges and culverts will be erected during the winter, so that the line may be opened for traffic early in the season.

Missouri Pacific.—Tracklaying was to have begun Nov. 1 on the new Omaha line from Union, Cass County, north to Gilmore Sarpy County, Neb., on the Union Pacific road, eight miles south of Omaha. The length of the line is 25 miles. Nearly all the grading is finished. E. P. Reynolds, of Wymore, Neb., is the contractor. The maximum grade is one per cent., and the maximum curvative is four degrees.

Mohawk Valley & Northern.—Articles of incorporation have been filed in New York to build a road from Poland, Herkimer County, via the town of Trenton, the villages of Gang Mills, Noblesborough, and Wilmurt, a distance of 25 miles. The capital is $350,000.

New Albany, Highland & Suburban.—The contract has been let for grading two miles of this road in New Albany, Ind. The work is now in progress. It is a steam road, and is being built for suburban traffic. J. F. Gebhart, of New Albany, is President, and E. B. Coolman is Chief Engineer.

New Iberia, Vermillion & Western.—This company has been organized in Louisiana with a capital stock of $300,000, for the purpose of building a railroad from New Iberia west to the Vermillion River. The following are the directors: Judge R. S. Perry, Captain E. A. Pharr, Dr. Jas. A. Lee, Judge Fred L. Gates, Jas. Callahan, H. F. Lewis, A. Erath and G. Simon.

New Roads.—The Jacksonville Peace River Phosphate Co. is building a road from Phosphate Junction, on the Florida Southern, to Phosphate City, Fla., where the mines of the company are located. Henry Robinson, of Jacksonville, is President, and A. G. Bigelow, of Lake View, Fla., is General Manager.

Northern Pacific.—Work on the extension from Faulkton, N. Dak., will continue until the ground freezes. The branch from Milnor to Valley Junction, N. D., will also soon be built. This will give the road a direct short line to Wadina, Minn., where connection is made with the main line.

Ottawa & Parry Sound.—The company expects to have the locating surveys for about 138 miles of the road completed by the end of this year and filed with the Department of Railways and Canals at Ottawa. The preliminary surveys have been made over the entire route from the connection with the Canada Atlantic at Ottawa to Parry Sound. Two charters have been secured for the line by the Ottawa & Parry Sound and Ottawa, Amprion & Renfrew companies. Government bonuses to the extent of $520,000, on a portion of the line, have already been granted, and it is expected that government aid will be granted over the whole distance of 245 miles. The authorized bonding power is $25,000 per mile. The proposed line will extend through one of the finest pine countries in the Province of Ontario, and also through a large district of arable country, which now awaits railroad facilities to insure its rapid development. The company's officers believe that for many years after the road is built, it will be taxed to nearly its full capacity to transport the lumber along and contiguous to the line. A large through grain traffic is expected from Parry Sound harbor, where the road reaches the waters of the Great Lakes. This route, it is claimed, will be 150 miles shorter to the seaboard at Boston or New York

than any of the present routes. It is the intention of the company to erect elevators at Parry Sound or in the vicinity of Georgian Bay, and to build steamers to run to Duluth, Milwaukee, and other points on the lakes. A. W. Fleck is Secretary, and George A. Mountain is Chief Engineer. The general offices are at Ottawa.

Peninsula Railway & Navigation Co.—This Company is building a road from Allyn, on Case's inlet, to Bergen, on Hood's canal, Wash., a distance of four miles. It is intended to continue it do wn to Union City, about 16 miles in all.

San Diego, Cuyamaca & Eastern.—This road is to be extended at once from its present terminal 24 miles from San Diego, to the station of Salton, Cal., on the line of Southern Pacific. The distance is about 119 miles. Gov. R. W. Waterman is President of the company.

San Diego, Phœnix & Galveston.—It is stated that arrangements have been made by this company, recently chartered in California, to build 20 miles of the road at once. It is to extend from San Diego Bay to the Colorado River, near Young, Arizona. The capital stock is $1,900,000, and of this amount $190,000 has been subscribed.

San Francisco & North Pacific.—The company will shortly extend its main line six miles north of the present terminal at Ukiah, Cal.

Shelbyville, Nashville & Northern.—This company has been incorporated in Tennessee. D. B. Cooper, Dr. A. Sandusky, A. A. McCorkle are incorporators.

Temiscouata.—The track on the St. Francis branch of the road is now laid up to Clairs, opposite to Fort Kent, on the United States side of the St. John River, and 20 miles from Edmundston, N. B., where it connects with the main line. It is not intended to lay beyond this point this season. The line is ballasted for 14 miles, and it is expected to have it finished up to Clairs by the middle of the month, when it will be opened for passenger traffic. The line is located for 16 miles beyond the end of track. The contractors were Malcolm & Ross. R. Adams Davy is Chief Engineer.

Terminal City.—The proposals for building this six-mile road in Nova Scotia, referred to last week, will be received until noon, Nov. 15. The location has been made from the present terminus of the Intercolonial road at Mulgrave, to Terminal City on the Strait of Canso. It will be operated as part of the Intercolonial when completed. The capital stock is $500,000, and this is reported to have been all subscribed, and the necessary amount of bonds will also be subscribed. The maximum grade is 26 ft. per mile.

Toledo & Ohio Central Extension.—The extension of this road from Amesville to Newton, O., where it connects with the main line of the Toledo & Ohio Central, will be completed this month. The contractors are Stearns, Shaw & Co., of Columbus, O. The work has been very heavy and includes one tunnel, 1,500 ft. long, and one tunnel 250 ft. long. The maximum grade on this extension is 52.8 ft. per mile, and the maximum curvature is eight degrees. The principal stations on the new part of this line are Amesville, Federal, Lewis and Bishopville.

Wautauga Valley.—The contract for building five miles of the road, from Carter's, Tenn., to Wautanga Point, on the East Tennessee & Western North Carolina road, has been awarded to Durand & Murphy, of Chattanooga. Work is to be commenced at once.

Wilmington, Onslow & East Carolina.—The company expects to extend the road from Jacksonville to New Berne, N. C., at once, under the name of the East Carolina Land & Railroad Company. Two or three routes are under consideration, and preliminary surveys have just been completed over two of them. The length of the line is 38 miles. The grading is light. The maximum grades is 45 ft. per mile, and the maximum curvatures is two degrees. There will be a small iron drawbridge over Trent River. F. L. Pitman, of Wilmington, N. C., is Chief Engineer.

GENERAL RAILROAD NEWS.

Canadian Pacific.—The gross earnings of this company for September, 1890, were $1,607,715; the operating expenses were $895,663, and the net earnings were $712,052, a decrease over the same month of last year of $48,665. For the nine months, Jan. 1 to Sept. 30, the gross earnings were $11,503,102; the operating expenses were $7,400,504, and the net earnings were $4,102,598, an increase of $98,027 over the same period of last year.

Chicago, Burlington & Quincy.—The earnings and expenses for September and the nine months to Sept. 30 were as follows:

September.	1890.	1889.	Inc. or Dec.	
Gross	$3,244,408	$3,180,677	I.	$63,791
Oper. expenses	1,917,979	1,750,398	I.	167,581
Net earnings	$1,326,489	$1,430,279	D.	$103,790
Charges	761,890	744,386	I.	17,504
Balance	$564,599	$685,893	D.	$121,294
Since Jan. 1:				
Gross	$25,919,120	$24,435,668	I.	$1,483,452
Oper. expenses	17,178,908	15,801,148	I.	1,377,760
Net earnings	$8,740,212	$8,634,520	I.	$105,692
Charges	6,857,004	6,699,470	I.	157,534
Balance	$1,883,208	$1,935,050	D.	$51,842

Cincinnati, Saginaw & Mackinaw.—Reports have been current this week, based on London cable dispatches, that this road had been leased to the Chicago & Grand Trunk for 99 years. It extends from Durand north through the Saginaw Valley to Saginaw, Mich. A similar report was published last September, but it was then denied.

East Tennessee, Virginia & Georgia.—The annual report for the year ending June 30, 1890, shows the following results: Gross earnings, $6,412,078; operating expenses, $4,338,838; net earnings, $2,073,240; surplus for the year after 5 per cent. dividend on first preferred stock, $171,184. The operating expenses, exclusive of taxes, were 65.12 per cent. of the gross earnings. Average mileage was 1,104.4 miles; gross earnings, per mile, $5,827.04; net earnings per mile, $2,032.07. The number of passengers transported was 1,025,360, an increase over the preceding year of 151,869 passengers, or about 17.3 per cent. Mileage of passengers was 58,717,071, an increase of 8,499,558 passenger miles, or about 16.9 per cent. Average rate per passenger was 2.46 cents, or 0.06 cents greater than the average rate of the preceding year.

Louisville & Nashville.—The following table shows the earnings and expenses of the system for September, 1890, and for the three months from July 1 to Sept. 30:

September:	1890.	1889.	Inc. or Dec.	
Gross earnings	$1,665,728	$1,615,419	I.	$50,309
Oper expenses	1,052,089	931,620	I.	121,069
Net earnings	$613,639	$683,799	D.	70,160
July 1 to Sept. 30:	1890.	1889.	Inc. or Dec.	
Gross earnings	$4,917,850	$4,701,191	I.	$216,659
Oper. expenses	3,095,205	2,728,119	I.	367,086
Net earnings	$1,822,645	$1,973,072	D.	$150,427

Pennsylvania.—The operations of the lines east of Pittsburgh and Erie for September and nine months were as follows:

September	1890.	1880.	Inc. or Dec.	
Gross earnings	$5,780,339	$5,428,733	I.	$351,606
Operating expences	3,552,968	3,448,905	I.	104,063
Net earnings	$2,227,371	$1,979,828	I.	$247,543
Since Jan. 1.				
Gross earnings	$49,044,167	$44,668,603	I.	$4,335,564
Operating expenses	34,193,057	29,790,176	I.	4,402,881
Net earnings	$14,851,110	$14,878,427	D.	$27,317

The western lines show for September a gross increase of $458,289, and a net increase of $246,847. For nine months the western lines show a gross increase of $4,028,372 and a net increase of $1,326,619.

Pittsburgh, Cincinnati, Chicago & St. Louis.—A mortgage for $75,000,000 has just been placed on record in the Recorder's office at Pittsburgh. It is a consolidated mortgage given by the company to the Farmer's Loan & Trust Co. and W. N. Johnson, of Indianapolis, Trustees. The document is dated Oct. 1, 1890. In the articles of agreement under which the consolidation was effected it is provided that means shall be procured to pay off prior sectional bonds outstanding and which are liens on various portions of the railroads, and for the payment of other indebtedness of the different companies of the consolidation. To do this the issue from time to time of $75,000,000 in bonds was authorized.

Union Pacific.—The preliminary statement of the earnings and expenses for September is given below:

September:	1890.	1889.	Inc. or dec.	
Gross earnings	$3,940,064	$3,808,201	I.	$131,863
Oper. expenses	2,390,343	2,136,390	I.	253,953
Surplus	$1,549,720	$1,671,810	D.	$122,089
Miles operated	7,547	7,409	I.	138
Jan. 1 to Sept. 30:				
Gross earnings	$31,553,090	$28,072,852	I.	$3,480,238
Oper. expenses	21,016,391	17,235,016	I.	3,781,374
Surplus	$10,536,699	$10,837,835	D.	$381,136
Av. miles operated	7,551	7,374	I.	177

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Nov. 5, 1890.

There is no material change in the traffic situation this week from that outlined in my letter last week. The withdrawal of through billing and divisions between the Union Pacific and all its eastern connections at the Missouri River, except the Chicago & Northwestern, embraces not only Omaha, but the other river gateways as well. The order was effective Nov. 1. The Northwestern is evidently disposed to co-operate heartily with the Union Pacific and will insist upon making divisions satisfactory to the latter. The action of both roads will come before the Western Freight Association at its meeting next week, and there seems to be but one result probable, and that is the withdrawal of the Northwestern and the Union Pacific or their expulsion from the association for violation of the association agreement. That this will result in a general rate war is not necessary, and many think that the roads will be inclined to accept the situation for the present, at least, rather than sacrifice a large amount of their revenue, which is at preseat very satisfactory. The position of the Union Pacific has evidently been taken only after the deliberate consideration of the situation and indicates that the officers are convinced that they can maintain it. President Adams' statement of the case is as follows: "Our proportion of the through rate has been too low. Our connections have been taking the lion's share. We have been accepting a pro-rate on the basis of 60 cents to the Missouri River from Chicago. Formerly those roads pro-rated with us on a 75-cent basis. Rates from Chicago to the Missouri River have been restored by our Eastern connections, but they still want us to pro-rate on the 60-cent basis. This we will not do. The Northwestern readily consented to allow us the increased division, and we simply notified the other roads that they must allow us the same, or we would have to refuse to do any through business with them. Under our contract we cannot accept less from them than from the Northwestern, and the Northwestern alone gives us more business than we can effectually handle without increased facilities."

A rumor is current that the Vanderbilt interest intends to take the Chicago, Milwaukee & St. Paul and Elgin, Joliet & Eastern into the "combine" and thus place itself in a position to more effectually carry out the current projects.

The passenger outlook is more favorable for a maintenance of rates and the abolishing of deals with scalpers than for some time. The withdrawal of the second class rates to St. Paul will remove a large block of this business from the hands of the scalpers, and Chairman Finley seems confident that the roads will live up to the agreement.

Considerable friction has developed in the efforts of the Western lines to conform to the recent order of the Interstate Commerce Commission in respect to the hog rates. The majority of the lines are in favor of placing the rates on live hogs and packing house products on a compromise basis—say 22 cents per 100 lbs.—but the Alton proposed to adopt the 18 cent rate on live hogs, reducing the rate on these to the level of packing house products. The matter will be further considered at the regular meeting of the Western Freight Association next week.

Meetings of the various associations next week are as follows: Western Freight and Central Traffic Associations, Tuesday; Interstate Commerce Railway Association, Wednesday.

The traffic for October of the Southwestern lines, eastbound from the Missouri River, was 12,835 cars. Of this the Atchison took 30 per cent., Burlington 17, Alton 12, St. Paul and Missouri Pacific each 9, Wabash and Fort Scott each 7, Rock Island 5, and Chicago, St. Paul and Kansas City 4.

Alton officials assert that at least three roads still disregard the agreement to maintain passenger rates after Nov. 1, and that Kansas City scalpers have several months' stock of unlimited tickets via three roads.

Traffic Notes.

The express companies have agreed upon an advance in rates on merchandise beginning Nov. 1. The increase is on the basis of 50 cents per 100 lbs. between Chicago and New York.

The party-rate case, decided against the Interstate Commerce Commission by the Circuit Court at Cincinnati, has been appealed to the United States Supreme Court, and that court has advanced it on the docket, but the date of bearing will not be fixed until there is a full bench.

On the request of a committee from Sargent County, N. D., the Great Northern, Northern Pacific and Soo lines have granted reduced rates on fuel and food for destitute people in that county. The roads will carry food and fuel at half rates from Nov. 1 to Dec. 15. They also will each carry 10 cars free. The county commissioners held a special meeting to take action in regard to the 30 free cars.

The strife between the Rome, Watertown & Ogdensburg and the Erie roads for the excursion business from Niagara Falls to New York has become intensified and the former now announces a round trip rate of $5 between the two points to meet the similar rate made by the latter. The Ogdensburg formerly ran an excursion a week at $10, and the Erie cut the rate in half. The Ogdensburg now announces two or three excursions a week.

The "Soo" line a few weeks ago reduced the second-class passenger rate from St. Paul to points in Scandinavia about $15, sending passengers via Montreal, New York and the North German Lloyd steamers. The North German Lloyd line gave orders to its Western agents to stop the sale of these tickets, but it is said that their sale is still going on. The Chicago & Northwestern has therefore announced that it would meet the rate of the "Soo" line from St. Paul to points in Scandinavia, by way of the Grand Trunk to Niagara Falls, and thence to New York over one of three trunk lines; thence across the ocean by the Hamburg-American steamships.

The Interstate Commerce Commission.

The decision of the commission, made by Commissioner Bragg, has been announced in the case of W. S. King & Co., Boston, against the New York, New Haven & Hartford and the New York & New England, involving the question whether these rail lines can make a joint through rate on shipments of flour from New York to Boston lower, to meet the competition of the Metropolitan Steamship Line, than the combined local rates of the two rail carriers from New York to Readville, Mass., where no such competition exists, and it was decided that the carriers could do this without violating the long and short haul clause of the act to regulate commerce.

The Commission has decided in the case of Capehart & Smith, owners of a steamboat on the Tennessee River, against the Louisville & Nashville and other roads, that it is not unjust discrimination or unlawful preference for a railroad company to make an arrangement for through billing and through rates with one steamboat line and refuse to do so with another.

Freight from Asia via Canada.

In a communication to the Senate concerning this subject Secretary Windom says: I am informed that since the completion of the Canadian Pacific Railway goods arriving at Vancouver, British Columbia, from Asiatic ports, destined for the United States, have been placed in the cars of that company, which were then sealed by the United States Consul at that port and forwarded to their destination in the United States. I find that this practice has been acquiesced in by this department in so far that the customs officials at the frontier ports of arrival have respected the consular seals and allowed the cars to go forward without entry and examination of their contents if the seals were found intact. I am of the opinion that it was the intent of the law to confine the privileges of the consular seal to cars containing merchandise of the contiguous country, and that such privilege does not extend to cars containing imported merchandise landed in the contiguous country for transit through it to the United States. In this view of the law it is in contemplation to restrict the privilege to cars containing merchandise of the contiguous country.

Damages for Discrimination.

The Supreme Court of Iowa has affirmed the decision of the Jasper District Court, giving Cooke & Wheeler, stock dealers, of Newton, judgment against the Chicago, Rock Island & Pacific for $2,750. The road gave certain shippers a secret rebate on each car. Cooke & Wheeler proved the existence of this rebate system, and the court held that it was an unjust discrimination and that the plaintiffs had been overcharged an amount on each car they shipped equal to the rebate given the other persons.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Nov. 1, amounted to 69,353 tons, against 68,037 tons during the preceding week, an increase of 1,316 tons, and against 63,940 tons during the corresponding week of 1889, an increase of 413 tons. The proportions carried by each road were:

	W'k to Nov. 1.		W'k to Oct. 25	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	8,344	12.1	9,015	13.2
Wabash	3,512	5.0	3,337	4.9
Lake Shore & Michigan South.	10,474	15.1	11,343	16.7
Pitts., Ft. Wayne & Chicago	6,315	9.2	6,630	9.7
Chicago, St. Louis & Pitts.	12,592	18.2	10,421	15.3
Baltimore & Ohio	3,486	5.1	3,661	5.4
Chicago & Grand Trunk	8,289	12.0	8,690	12.8
New York, Chic. & St. Louis	8,155	11.8	7,594	11.2
Chicago & Erie	7,970	11.5	7,346	10.8
Total	69,353	100 0	68,037	100.0

Of the above shipments 2,380 tons were flour, 28,558 tons grain, 2,504 tons millstuffs, 5,507 tons cured meats, 2,015 tons lard, 8,499 tons dressed beef, 1,189 tons butter, 1,904 tons hides, 333 tons wool, and 7,996 tons lumber. The three Vanderbilt lines together carried 39.0 per cent., while the two Pennsylvania lines carried 27.4 per cent.

During the week the lake lines carried 55,154 tons, against 54,098 tons during the preceding week. Of the shipments 618 tons were flour and 50,230 tons grain.